S C I A T I C A.

PATHOLOGY AND TREATMENT

WITH A CLINICAL STUDY OF FIFTY CASES.

By

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S C I A T I C A.

DEFINITION.

Sciatica may be defined as pain felt in the distribution of the sciatic nerve. Fletcher (1946) rejects the tendency to limit the term, sciatica, to cases in which there is definite evidence of compression of the lumbo-sacral roots, and prefers to use it in its all-embracing sense. He points out that the essential features are "The distribution of pain over the buttocks, the back of the thigh, the calf, the lateral aspect of the leg and sometimes the foot."

It is important to emphasise at the beginning that sciatica is a symptom and not a disease per se; though it must be admitted that in sciaticas due to involvment of the inter-vertebral discs, the signs and symptoms amount to a syndrome at least.

The sciatic nerve is the largest nerve in the body. It originates from the lumbo-sacral portion of the cord, and supplies the whole extent of the lower limb. In its course from the cord to its termination in the foot it is in contact with a great variety of structures - bony, ligamentous and muscular. The pelvis, through which the nerve passes, is frequently affected by tumour growth of the organs which it contains.

Its bony and ligamentous framework is subject to mal-formations, and to the effects of stress and strain. It will be realised, therefore, that pain in the course of the sciatic nerve may be caused by many different conditions, the exact nature of which will require extensive investigation.

A TREATISE
ON THE
NERVOUS SCIATICA,
OR,
Nervous Hip Gout.

BY
DOMINICUS COTUNNIUS, Phil. & Med. D.

LIBERTAS, QUÆ SERA TAMEN RESPEXIT INERTEM,
RESPEXIT TAMEN, ET LONGO POST TEMPORE VENIT.
VIRGIL. Buc. Ec. I.

LONDON:
Printed for J. WILKIE, No. 71, St. Paul's Church-Yard.
M.DCC.LXXV.

TITLE PAGE OF ENGLISH TRANSLATION
COTUGNO'S TREATISE.
1775.

HISTORY:

Sciatica was known to the Greeks and was mentioned in the writings of Hippocrates. However, owing to the lack of anatomical and pathological knowledge of the older writers the descriptions are obscured by humours and vapours.

Stockman (1928) quotes Lazarus Riviere (1589-1655) who followed the teaching of Guillaume de Baillou of Paris (1538-1616) as stating that sciatica was due to an arthritis of the hip. At the same time he was struck by the wide extent of the pain compared with other joint affections.

The first full account of sciatica was written in 1764, by Domenico Cotugno (Dominicus Cotunius).

Cotugno was a physician and anatomist of Naples and is celebrated as the discoverer of the cerebro-spinal fluid and the endolymph of the semicircular canals.

His book is entitled "A Treatise on the Nervous Sciatica, or Nervous Hip Gout." It was translated into English in 1775.

Cotugno worked and performed his investigations in the "Great Neapolitan Hospital of Incurables" and dedicated his book to its "Most Noble Patrons and Governors."

His preface, he dedicated to Gerard Van Swieten of Leyden (1700-72), a pupil of the great Boerhaave (1668-1738) who, with Cullen in this country, were the two greatest physicians of the time in Europe.

Cotugno's discovery of the cerebro-spinal fluid, influenced his mind in other directions and he naturally sought to connect this fluid with the nerves derived from the spinal cord.

He conceived sciatica to be due to an alteration of the

fluid contained in the vagina or sheath of the sciatic nerve, the fluid being continuous with that of the spinal theca.

He observed that the pain in sciatica was frequently worse at night, and supposed that this was due to increased arterial flow to the nerve sheath, with obstruction to the venous outflow. This was due to the "sizy" state of the fluid; that is, the fluid, unlike the normal cerebro-spinal fluid, tended to coagulate in the sheath.

Cotugno observed that pelvic congestion increased the pain, and was glad to see "a flux of the piles", which he thought relieved the congestion.

He tells of one man with sciatic symptoms, who had a repeated flux at intervals, who, most likely, suffered from cancer of the rectum.

Cotugno divides sciatica into two main varieties: the Arthritic, and the Nervous Sciatica. He sub-divides this into Anterior and Posterior Sciatica. He says "The one is a fixed pain in the hip, situated chiefly behind the great trochanter of the thigh, and extends itself upwards to the Os Sacrum and downwards by the exterior side of the thigh, even to the knee. This pain seldom stops at the knee, but often runs on the exterior part of the head of the fibula and descends to the fore part of the leg, where it pursues its course along the outside of the anterior spine of the Tibia, before the exterior ancle, and so ends in the Dorsum Pedis."

Certainly this is an accurate description of the extent of sciatic pain.

His Anterior Nervous sciatica is in the course of the crural nerve.

Cotugno's description of symptoms is also very accurate, and he stresses not only the variation of the pain, but also the tendency of the pain to be worse at night and on movement.

He mentions alteration of sensation in the dorsum of the foot, and observes that the "semi-paralysis"differs from that of diabetic and tabetic neuritis.

Cotugno was faced with the same difficulty as we are, of proving the theory of neuritis; that of pathological proof, sciatica not being a fatal condition. A patient having died with sciatic symptoms, Cotugno eagerly took the chance to perform a post-mortem examination.

The patient was a soldier who had had a fever terminated by a dropsy and who, during the course of his illness, showed signs of sciatica.

Unfortunately, owing to the hot weather and the state of the body, which rapidly became worse, Cotugno was only able to examine one sciatic nerve. The sheath of the nerve was inflamed and contained much fluid, although the nerve itself was whiter than usual.

He says, somewhat wistfully, "But as it was now in the heat of summer and the buttocks stunk intolerably and we were all, not without cause, much afraid of infection, I did not examine the left Ischiadic nerve; which might perhaps have shown whether the colour of the right was in reality accidental or natural and proper in that particular man, and therefore dared not determine anything from that dissection."

Still, having made up his mind that a neuritis with dropsy of the nerve sheath was the cause, he stuck to his theory and strengthened his conviction by the success of his method of treatment.

Cotugno's treatment had for its object the withdrawal of the altered fluid from the nerve sheath. His contemporaries were wont to apply the actual cautery to the front of the leg and also to other parts of the nerve. He used what he considered to be a more refined and successful method. He applied a blistering paste to the outside of the leg just below the knee, and extending for about four inches up and down the leg. By this means he obtained a blister containing several ounces of fluid which, he imagined, had been drawn from the sheath of the nerve.

The benefit of the site below the knee was, according to Cotugno, that fluid could be drawn from the thigh and the leg at the same time.

However this may be, Cotugno gained great fame from his treatment, and patients came from far and near to be treated by him.

Whatever may be said of this treatment it was mild compared with that of his contemporaries, who employed clysters, which were pumped in and out with such vigour that there were violent "fluxes" of blood.

These fluxes were highly approved of as relieving the congestive humours. When all is said, this treatment is not much more heroic than that inflicted upon the unfortunate victims of sciatica in more modern and enlightened times.

THE NEURITIC THEORY.

Cotugno's theory of neuritis displaced the older ideas of arthritis of the spine and hip joint, and held the field during the whole of the nineteenth century, and which even up to the present time has its advocates.

Gowers, in his "Diseases of the Nervous System" (1886) recognises that sciatic pain may be caused by pressure on the nerve in the pelvis, as by tumour growth. He goes on to say, however, "in a stricter use of the word, however, it is applied to painful affection of the nerve, not due to any cause outside it ..... the vast majority of cases of sciatica are really cases of neuritis of the sciatic nerve."

He goes on to say that gout is a potent factor in the production of this neuritis, as is also muscular rheumatism. He says "it is, I think, most common among those who are gouty but who do not suffer from articular gout." Exposure to cold and wet are stated to be the main contributory causes. Gowers also stresses the importance of distinguishing between diseases of the hip joint and true sciatica.

Treatment remains similar, though possibly less heroic then that of Cotugno. Counterirritation, by blister and mustard plaster, are recommended.

Nerve stretching is also mentioned, but is looked upon as a form of counter-irritation, and beneficial by leading to enforced rest in bed.

TEXTBOOKS OF MEDICINE.

As textbooks of medicine reflect the current teaching of their time, it is interesting to examine some of the standard

works, from the time of Gowers to the present day.

"Textbook of Medicine", by Fagge and Pye-Smith (1901), mentions that some have held sciatica to be a neuralgia, but but maintains that it is a "true neuritis."

The question why this neuritis differs from multiple peripheral neuritis, is answered by observing that, "the seat of the lesion in sciatica is the vascular connective tissue of the nerve trunk, its perineurium .... presses on the sensory fibres enough to give pain, but not to abolish their power of conduction."

The gouty diathesis is also maintained to be a cause. As regards treatment, the blister is again recommended. Here the blister extends from the fold of the buttock down the course of the nerve, the distance not being stated.

The blue pill at night with saline in the morning are advocated, but nerve stretching appears to be out of favour.

Monro, in his "Manual of Medicine," (1917) stresses the factors of gout and cold, but also mentions pressure, as in the case of coal miners, who work lying on their side. He is careful to qualify this by saying that their clothes become wet.

Monro makes an interesting observation, quoting Genesis xxxii 32, and stating that "the sinew which shrank" is the sciatic nerve.

Osler in "Principles and Practice of Medicine," ninth edition (1920), says that primary neuritis is very rare except in diabetes and gout.

Arthritis of the spine, lumbo-sacral, sacro-iliac and hip joints is mentioned as a possible cause of sciatica.

For the first time abnormality of the 5th lumbar vertebra is suggested as a factor. Osler takes the broad view of sciatica as symptomatic of pelvic and spinal abnormality or growth, and no attempt is made to restrict the term.

As regards treatment, the importance of rest is stressed, and heat is advised, either by means of hot bottles or by the electric blanket.

Blistering and acupuncture of the nerve are suggested, and also injection of novocaine into the nerve.

In Taylor's Practice of Medicine (1930), sciatica is divided into idiopathic and symptomatic.

Of the former variety it is stated that the cause is debatable, but that some maintain that interference with the roots in the spinal foramina is the cause, while others think that it is a neuritis.

The author compromises by saying that there is probably truth in both hypotheses.

Rest in bed, heat, either by hot bottles or electricity is recommended.

Massage appears now in treatment and a warning is given against its use in the acute stage.

Beaumont's Medicine (1937) gives sciatic neuritis as a synonym for sciatica and the common type is said to be due to fibrositis of the lumbar region, originating from strain and spreading to the nerve sheaths later.

Beaumont warns against all violent measures such as nerve stretching.

He recommends heat and massage and, in intractable cases, epidural injection of novocaine.

The latest textbooks of medicine, for instance, Cecil's (1944), now divide the subject into fibrositic and disc sciatica, and these are discussed separately. The surgical aspect is now prominent, especially in American textbooks.

Purves Stewart, in his Diagnosis of Nervous Diseases(1931), divides sciatica into sciatic neuritis and sciatic neuralgia.

He states that it occurs as a rule independently of gross lesions such as tumour or tuberculous disease of the spine and neighbouring structures and, following the teaching of Putti, he says that the commonest cause of root pain is an arthritis of the intervertebral joints, involving the nerve in the intervertebral foramina.

There is no mention of the intervertebral disc. Sacro Iliac arthritis is mentioned as a possible cause. Purves Stewart here shows that pain is greatest when the patient is going upstairs. My experience is that patients complain more of pain when going downstairs, especially in disc cases. This is to be expected as the shock to the damaged parts is bound to be greater the more weight is put upon them.

This author, whose work always commands respect, gives a most accurate description of signs and symptoms. In addition to Lasegue's sign, he mentions Rose's gluteal sign, in which on striking the attachment of the gluteal muscles to the sacrum, a contraction of muscular bundles takes place on the affected side, whereas on the sound side the whole muscle contracts. However, he becomes rather involved in an attempt to differentiate between neuritis and neuralgia, which in the light of modern knowledge of disc lesions, seems unnecesaary.

Muscular wasting is carefully described and the effect of

loss of muscular tone is shown by the "T" square sign. In this test the patient is made to kneel on a chair with the feet projecting beyond the edge of the chair. The foot on the sound side is slightly extended, owing to the tonicity of the gastrocnemius, whereas the other foot falls into a position at a right angle.

Purves Stewart shows that in hysterical sciatica, the patient's complaints tend to be rather more dramatic than in organic sciatica, and that areas of anaesthesia tend to be more complex in the former, while the limp is also more exhibitionist. Muscular wasting may occur in the hysterical case but the ankle jerk does not disappear.

PIONEER WORK.

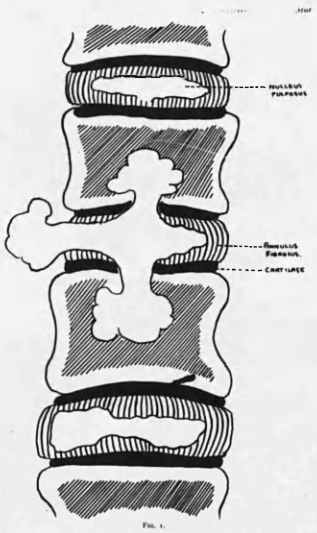
The conception of the pathology of sciatica remained virtually unchanged until 1911 when Goldthwait of Boston published, in the Boston Medical and Surgical Journal, an article which suggested the intervertebral disc as a cause. Goldthwait's work showed investigation of a very high order, and the description of his case might have been written to-day so clear is the picture of disc lesion.

It is surprising that very little more was heard of disc sciatica until many years later.

In 1927 Putti of Bologno delivered a lecture to the University of Liverpool, which was reported in the Lancet of the same year.

He described abnormalities of the spinal column and the intervertebral foramina with a wealth of anatomical detail from his own research.

FIG. 1



TYPE OF DISC RUPTURE.
(after Schmorl).

He concluded, "Sciatic pain is symptomatic of vertebral arthritis, except in those cases where itt is a symptom of a neuritis of specific nature.

Sciatica is a neuralgia caused by pathological conditions of the intervertebral foramina, especially of the intervertebral articulations.

In other words sciatica is a symptom of neurodicitis and lumbar arthritis.

It is surprising that with all his research Putti did not think of the intervertebral disc as a possible cause.

In 1927, however, Schmorl of Dresden published the result of autopsy on three thousand vertebral columns.

He found a prolapse of the disc in 38%, in 23% into the vertebral body, and in 15% backward into the canal.

This work stimulated research by surgeons and others, and shortly reports of chondromata of the intervertebral discs began to be published.

The names of Dandy and Mixter are associated with these findings.

It was not, however, until 1934 that Mixter and Barr showed that these tumours were really herniations of disc tissue.

In 1937, Barr, Hampton and Mixter, in an article "Pain, low in the back, and Sciatica," described fifty-eight cases of proved rupture of intervertebral disc; that is proved by operation

At operation, however, discs were not found on all occasions, and Denny Brown (1933) had published the report

of a case with findings not unlike those of Cotugno. This was a case where a woman with sciatic symptoms had died following the injection of oxygen round the nerve.

The patient had also suffered from disseminated sclerosis.

Hyperaemia and exudate were found in the nerve sheath, and also evidence of a chronic polyneuritis. The hyperaemia may have been due in part to the injection of oxygen.

From 1937 progress was rapid and surgeons on both sides of the Atlantic continued to publish a large number of cases of disc sciatica.

Love and Walsh (1940) published five hundred cases proved by operation.

There still remained the question of cases with undoubted disc symptoms where, at operation, no prolapse of the disc was found.

However, in 1941 Dandy published a series of cases of what he called "concealed disc." These were cases where a degenerative process was found in the disc, although it had not ruptured. This led to alterations in the vertebral relations and to adhesions involving the nerve root.

The removal of the pathological material alleviated the pain.

At the present time few will deny that prolapsed disc is a well established cause of sciatic pain, though it is admitted that other causes also exist. Pennybacker in the Medical Annual (1947) makes the statement that "protrusion of the lumbar intervertebral disc is THE common cause of sciatica."

D. Petit-Dutaillis and S. de Seze (1945) in their monograph on sciatica and low back pain give an admirable account

of disc sciatica, pathology, symptomatology and operative treatment, which should be read by all who are interested in this subject and can read it in the original French.

As well as the usual prolapse of disc these authors describe cases in which a portion of the disc prolapse had been cut off, thus acting as a loose body and leading to repeated exercerbations of sciatic pain.

CLINICAL FEATURES.

ANATOMY.

In view of the diverse opinions as to the cause of sciatica, and the structures held to be implicated, it is necessary to pay some attention to the anatomy of the region, not only the nerve itself but to that of the vertebral column, pelvis, ligaments and muscles.

The part of the spinal column involved in sciatica is principally the lumbo-sacral region.

When man adopted the erect posture he subjected this part of the body to particular stress and strain.

In the child, before it is able to sit up, there is practically no lumbo-sacral angle, but from that time the lumbo-sacral angle begins to form, so that in the adult there is an angle of 120 degrees (Lee McGregor 1946). The whole weight of the body is borne on the articulation between the fifth lumbar vertebra and the sacrum with the intervertebral disc intervening. Add to this, that this is the point where the mobile spinal column articulates with the rigid sacrum, and it will be realised that abnormality of development or posture will subject the part to considerable strain.

Nature attempts as far as possible to insure against this by providing a lavish supply of supporting ligaments. There are no fewer than nine sets of ligamentous structures. They are as follows:-

(a) Intervertebral fibro-cartilage
(b) Anterior longitudinal ligament.
(c) Posterior longitudinal ligament.
(d) Capsules of the joints, between the articular processes.
(e) Ligamenta flava.
(f) Interspinous ligaments.
(g) Supra-spinous ligaments.
(h) Lumbo-sacral ligaments.
(i) Ilio-lumbar ligaments.

THE VERTEBRAE.

Ossification.

A typical vertebra has three primary centres of ossification, one of the body and one for each transverse process.

At puberty five secondary centres form, one at the tip of the spinous process, one at the outside of each lateral process, and one for a plate of bone at the upper and lower surface of the body.

The mamillary processes also in the lumbar vertebrae, have separate centres of ossification.

Various abnormalities may occur in these ossification centres.

An abnormality of the ossification of the vertebral arch leads to the congenital type of spondylolisthesis.

In addition, there may be relative abnormalities where the fifth lumbar vertebra is fused with the sacrum, or where the first sacral segment is mobile - lumbarisation.

On occasions, the articular processes on one or both sides may fuse or may be absent. This leads to postural and mechanical deformity and a liability to injury.

It is surprising that abnormalities such as these can exist without causing symptoms. Brailsford (1929) says that

these abnormalities should not be accepted as the cause of symptoms until other possible causes have been fully investigated, At the same time, they may account for some forms of obscure low back pain..

Putti (1927) points out that the size of the intervertebral foramina diminishes from above downwards, while that of the corresponding nerve root increases. In this case the fifth lumbar root, the largest, passes through the smallest foramen. Putti also states, that the lumbar nerve trunk is not clothed by the arachnoid, but by a dural sheath only.

In addition, accompanying it there is a large venous plexus, which is influenced by congestion and stasis.

It will be seen, therefore, that this nerve trunk is not only exposed to the effect of bony abnormality, but also to pressure in the foramen.

Putti did not visualise the effect of rupture of an intervertebral disc upon the nerve trunk, but as his work was largely based upon X-ray findings this is understandable. He did not mention the ligamentum flavum as a pressure factor, probably for the same reason.

THE SCIATIC NERVE.

The sciatic nerve is the largest nerve in the body and is about half an inch in breadth.

Cunningham (Textbook of Anatomy, 1928), gives its origin from the fourth and fifth lumbar and the first, second and third sacral nerves. He states that it consists of two nerves, the tibial and the common peroneal, bound together by an

investing sheath, with a branch from each; the nerve to the hamstring muscles from the tibial and the nerve to the short head of the biceps femoris, from the common peroneal. Cunningham gives the following account of the course of the nerve:-

"The sciatic nerve leaves the pelvis and enters the gluteal region through the greater sciatic foramen, between the piriformis and the superior gemellus. It runs laterally and then downwards through the gluteal region in the hollow between the great trochanter of the femur and the tuberosity of the ischium, accompanied by the inferior gluteal artery and the arteria comitans ischiadii. It is covered posteriorly by the gluteus maximus and is in relation anteriorly with the following structures from above downwards - 1, the posterior aspect of the ischium; 2, the nerve to the quadratus femoris; 3, the superior gemellus; 4, the obturator internus; 5, the inferior gemellus,and 6, the quadratus femoris.

The nerve enters the thigh by escaping below the inferior border of the gluteus maximus, lying in the angle between the lower border of this muscle above and laterally, and the origin of the hamstring muscles medially.

It runs down the back of the thigh, on the posterior surface of the adductor magnus, and is covered by the long head of the biceps femoris, which crosses posterior to the nerve from the medial to the lateral side.

It usually terminates at the proximal angle of the popliteal fossa by dividing into tibial and common peroneal nerves, but the separation may occur at any higher level, and as already noted, these two nerves may even be distinct at their origin, in which case the <u>common peroneal usually</u>

pierces the piriformis."

It is well to note at this point that the nerve supply to the gluteal muscles is also from fourth and fifth lumbar. I shall refer to this later, when the question of fibrositis of these muscles is discussed.

THE INTERVERTEBRAL DISC.

As the intervertebral disc plays such an important part in the production of sciatic pain, I propose to discuss it separately.

The disc, according to Schmorl (1928), consists of three parts. These are:-

(a) A central portion, the nucleus pulposus
(b) An outer ring, the annulus fibrosus.
(c) The cartilaginous plates above and below each nucleus.

The Nucleus Pulposus.

The nucleus pulposus is the remnant of the notochord.

It is centrally placed and is firm, elastic and gelatinous in consistence.

It is under considerable tension, which varies according to the position of the body. The pressure upon the nucleus at rest, is stated to be twenty pounds to the square inch, and rises to about two hundred pounds pressure on bending and lifting weights.

The Annulus Fibrosus.

This part of the disc consists of fibro-cartilage and has fibres which are arranged both in a concentric and

radial manner. These fibres form a dense capsule for the nucleus. Both sets of fibres gain attachment to the nucleus centrally, and the radial fibres turn over the edge of the adjacent vertebra, and enter the bone.

The concentric fibres are attached in a similar manner, but in addition they insert into the anterior and posterior common ligaments of the spine.

The annulus is very securely attached to the bony surfaces of the vertebra to which it is related and some of its fibres actually arise in the cartilage plates. The union of the two bones and the intervening disc, is thus a very strong one.

The Cartilage Plates.

These are set on the top and bottom of the nucleus. They lie on the spongy bone of the vertebral bodies. They are the central non-ossified parts of the vertebral epiphyseal plates. The disc gains its nourishment from the vertebra by diffusion through these plates.

I am indebted to Lee McGregor's textbook of surgical anatomy (1946) for the substance of this description.

The intervertebral disc forms part of the anterior boundary of the intervertebral foramen through which passes the spinal nerve trunk.

It is for this reason, that displacement or rupture of the disc is likely to press upon the emerging nerve trunk.

When the discs between the 4th and 5th lumbar vertebrae and the sacrum are affected sciatic pain is caused.

The weakest portion of the disc annulus is the posterior part, and partly for this reason nuclear prolapse is usually backwards or postero-lateral in direction.

The ligamentum flavum forms the postero-lateral boundry of the intervertebral foramen and may be involved by nuclear prolapse, the nerve being compressed against it by the disc.

SIGNS AND SYMPTOMS OF SCIATICA.

Pain.

The clinical picture of sciatica varies greatly from case to case. The cardinal symptom is pain, in course of the nerve, the lumbo-sacral region and in the buttock.

Reaction to pain varies widely in different subjects and what is pain to one individual is discomfort to another.

Kellgren (1938), following the work of Sir Thomas Lewis (1938), has shown that pain varies according to the structure affected. For instance the pain sense in skin is much more highly developed than that of muscle and intestine. When the cornea is touched pain only is experienced, and when the eyeball is pressed upon a sensation of light is experienced.

There are apparently receptors for pain as well as for sensation, and in situations such as in the finger

Kellgren has demonstrated the separate receptors by experiment and by microscopic examination.

Stimulation of the skin by an electric spark first gives a sharp pricking sensation, and sensation from pin prick cannot be clearly differentiated from the former unless the stimulus is prolonged.

Deep pressure on muscular tissue gives a dull aching type of pain, but severe pain may be caused by exercising muscle when the blood supply is restricted. This is well seen in the case of intermittent claudication.

If hypertonic saline is injected into muscle, a sensation of burning pain is experienced, and in certain situations this is radiated over a definite area. It is well known that injection of certain drugs into the upper and outer quadrant of the gluteus muscles, will cause pain down the course of the sciatic nerve.

Pain in the hip joint may be experienced in the knee also and sometimes a lesion of the hip joint is not felt there but is complained of, in the first instance, in the knee.

This is well known to be the case in tuberculosis of the hip in children, and in osteoarthritis of the same joint in the elderly.

It may be seen, therefore, that the interpretation of pain in sciatica involves a knowledge, not only of the type of pain, but also of its distribution.

Clinical Appearances.

The usual picture of a case of sciatica is as follows.

The patient may have complained of pain in the lumbo-sacral region for some time, either of sudden or of gradual onset.

There may have been a history of sudden pain on lifting a heavy weight or a sharp movement may be blamed for causing it. On the other hand, the history of trauma may only be obtained after cross examination, or not at all. There is stiffness in the lumbar region with increased pain on movement, and sooner or later, perhaps from the start, pain begins to spread down the back of the thigh or down the full extent of the sciatic distribution.

Pain now varies both as regards time and type, at times shooting and burning and at other times dull and aching. It is nearly always worse at night.

This intermittent type of pain is characteristic of true sciatica and is said to differentiate it from that of hysterical or functional type, in which the pain is complained of as being constantly present.

In cases of moderate severity, the patient is able to be up and about.

But in severe cases he may have to be confined to bed; though he may not be able to rest there.

Cotugno illustrates this well when he says, that sometimes especially at night, the victim springs from bed and stands in the open, in order to cool the burning

in his leg.

Position in bed.

The patient lies in bed in the position which affords him the greatest relief from pain. This is usually on the affected side, with the knee and trunk flexed.

In the discussion later in this thesis, I shall try to show why this position of flexion is adopted.

Gait.

There is no definite gait in sciatica, but there is usually some flexion of the affected limb, so that the heel is raised slightly from the ground. The back is maintained stiffly and there may be a scoliosis either to, or away from the affected side.

As the case progresses, pain usually diminishes, but muscular weakness and neurological signs may supervene.

In long standing cases, muscular wasting may be considerable, affecting buttock, thigh and leg. In milder cases however, there is rather a loss of muscular tone than actual wasting.

Neurological Signs.

The knee reflex is usually unaffected, but may be altered in type - the term "glib" being given to it by Fletcher (1947).

The alteration is probably due to lack of tone in the antagonist muscles and gives rather a flapping quality to the reflex, which is more easily observed than described.

The Ankle Jerk is frequently lost or much diminished, though often there may be no change. Changes in the ankle jerkmay be in part due to muscular weakness, as well as to interference with the nervous reflex arc.

Plantar reflex is not usually affected.

Sensation.

Paraesthesiae are common, especially in the peroneal region and in the outer side of the foot and sole. Sensation in the sole of the foot may be blunted, so that there is complaint of the ground not being felt properly. There may also be cramps on walking any distance.

Coldness in the foot may be complained of, and objectively, this is found to be the case.

Sphincter disturbances

Occasionally patients complain of urgency of micturition and spasm of the rectum, but this is not common in uncomplicated cases.

Neurotic Element.

Emphasis is often laid on this aspect of sciatica, but I think that it is overstressed. In severe cases, insomnia and general disturbance caused by prolonged attacks of pain, will usually account for the nervous upset.

There is no doubt however, that in compensation and war cases, there may be a number who would exaggerate symptoms, in order to escape an unhappy condition. Hysterical sciatica has stigmata of its own, and should

not readily be mistaken.

The foregoing, describes the general appearances and signs of a case of sciatica.

It will be seen that the signs and symptoms consist of 1. Orthopaedic and 2. Neurological groups.

In some cases one group will predominate and in others, neurological signs may be absent.

For the sake of clarity, it is well to arrange these groups in tabular form, as suggested by Kellgren (1941).

Orthopaedic Signs.	Neurological Signs.
Postural deformity.	Absent ankle jerk
Limitation of back movements.	Sensory changes
Limitation of hip movements.	Motor paralysis
Wasting of leg.	Sphincter disturbances.

Movement of the trunk and leg is effected by muscular action, controlled by nerve supply, and limited by pain.

The pain may originate by direct involvement of the nerve in its origin or in its course. On the other hand, painful areas in bony or muscular structure may affect the nerve reflexly. That is, pain may be

referred from the structures implicated in movement or disease.

Sciatica, apart from that caused by gross tumour growth or by diabetes and similar conditions, falls into two main groups.

1. The disc syndrome, due to lesions of the intervertebral disc, and
2. The so-called Fibrositic and arthritic group.

It remains to be seen whether these are really separate groups, or whether the signs produced in the fibrositic group are also due to disc involvement to some extent.

There is a third group of various occasional causes, such as where neuro-fibromata involve the nerve itself, and the more uncommon pyriformis syndrome.

HISTORY AND EXAMINATION.

I shall now indicate the methods employed in the examination of a case of sciatica, and afterwards discuss the differential diagnosis of the various findings in relation to the case.

O'Connell (1942) gives the following scheme of examination, which I shall use with modifications.

A. History.

1. Distribution and type of pain.
2. Factors which induce variation in severity of pain.
3. Intermittency of symptoms.
4. Paraesthesiae.
5. Trauma.

B. Examination.

1. Age and sex of patient.
2. Mental state.
3. Spine.
4. Straight leg raising.
5. Sciatic tenderness
6. Motor disturbance.
7. Sensory disturbance.
8. Reflex disturbance.
9. Radiology.
10. Lumbar puncture.

A. HISTORY.

This has been already discussed in the general description of a typical case, and some statistics of the frequency of trauma may be of interest.

Le Vay (1944) gives fifteen cases out of a series of forty in which there is a history of trauma. The onset may be sudden, and the same authority gives 19 cases where this is so, in this series.

Sometimes the trauma is very slight and may not have been noticed at the time, but on questioning the patient may remember that he did have a pain in the back when lifting some object, or when bending down.

Apart from actual trauma, such as that caused by

lifting weights, there is very frequently a history of previous attacks of low back pain, and especially in themiddle aged and elderly, a previous complaint of lumbago is the usual precursor of sciatic pain.

It is probable that these recurrent strains cause inflammatory and degenerative changes in the annulus fibrosus of the disc, and that these changes lead to the eventual rupture of the annulus and protrusion of the disc substance.

EXAMINATION:

Age and sex of patient.

It is unusual to find sciatica in the young, most cases coming on between the ages of thirty and sixty. O'Connell gives the average age in disc cases operated on by him as thirty-five years.

It is an aphorism that sciatica coming on in the young or in the elderly for the first itme, should lead to a very careful examination, to exclude, in the young, tuberculosis, and in the latter, secondary growth in the spine or pelvis.

As regards sex, O'Connell states that the incidence of sciatica is four times as common in men as in women. This is based on observations on a series of seventy-five cases. This male frequency is probably accounted for by occupation, but may vary with the type of work done in different parts of the country. In Dundee, where a large number of women work in mills and factories,

I think that the ratio is closer.

Mental State.

I think that undue stress is laid upon this aspect of sciatica.

There is no doubt that in army and compensation cases there is sometiies an object in prolonging convalescente, and that in some cases bodily pain may be substituted for that of a mental kind, but most patients are only too anxious to be relieved of pain.

The effects of prolonged insomnia and pain have already been mentioned,and may produce a disturbed mental s tate.

The Spine.

There is often alteration in the lumbar curve, usually flattening with sometimes scoliosis to one or other side. Forward bending and lateral flexion are usually resisted but usually rotation is not much limited. Tenderness on pressure in the muscles on either side of the spine is sometimes present as well as pain in the lower spinous processes of the lumbar region.

Straight leg raising.

This is also referred to as Lasegue's sign, having been first described by him in 1864. There are several modifications, but generally the test is performed as follows.

With the patient lying on his back, the affected leg, with the knee straight, is raised from the bed.

At a certain angle pain may be produced; felt in the leg or in the lumbo-sacral region or both. Allowance must be made for the usual lack of elasticity in the muscles of the elderly, when interpreting this test. However, it is a useful manoeuvre, the mechanism of which will be discussed later.

The angle at which pain is produced, should be noted. It is stated that an angle of pain of under 40 degrees shows a severe involvement of the nerve and a correspondingly bad prognosis.

Lasegue's sign may be modified in the following way.

The sound leg should be raised first, and the angle noted.

The affected leg should now be raised, and there is usually a lesser angle of pain. Both legs are now raised together, and it will be found that the affected leg can now be raised further before pain is produced. The sound leg is now allowed to drop, when pain will usually be increased in the lumbo-sacral region, and perhaps down the leg also.

When the affected leg is raised to the point of pain, flexion of the neck will sometimes increase the pain. This is looked upon as a confirmation of a disc lesion.

The equivalent of Lasegue's test can be obtained by sitting the patient up in bed with the legs extended.

Sciatic tenderness.

Tenderness along the sciatic nerve is variable and its interpretation is doubtful. In many cases it will be seen that the tenderness is in the muscles, though

tenderness in the course of the nerve also occurs.

Tenderness in the gluteal muscles is also frequently found; in fact in the majority of cases, an area of tenderness may be found there.

Motor Disturbances.

Muscular wasting is present in the majority of cases, especially in the gluteal muscles, but all the muscles of the back of the thigh and leg may be affected. Occasionally, fibrillation will be noticed, in the Glutei.

Weakness of the extensors and flexors of the foot is sometimes present increased by exercise and muscular hypotonia may persist long after apparent cure.

Reflex Disturbance.

The ankle jerk is frequently lost early and the loss persists for a long time after pain has gone. Where the pain is confined to the buttock and thigh, the ankle jerk is more commonly preserved.

The plantar reflexes are not usually altered.

Occasionally, there is some disturbance of sphincter. control, with precipitancy of micturition and spasm of the levator ani.

The knee jerk is unaffected.

Radiographic Examination.

This should be carried out in all cases, though the results are mostly negative except where there is bony deformity.

Sometimes differences in the intervertebral spaces are shown, but this does not necessarily mean displacement

of disc. Osteoarthritic lipping and other osseous changes will be readily detected.

Lumbar puncture.

Should not be done as a routine, but reserved for cases where signs point to the possibility of spinal growth.

Lumbar puncture has become such a routine procedure in medicine that it is not generally appreciated that there may be any risk from its performance. In an editorial article in the British Medical Journal (June 11, 1949) however, two cases of disc prolapse from osteomyelitis of vertebral bodies are reported as having followed upon lumbar puncture.

Key and Ford (1948) state that it is possible to cause a lesion of the intervertebral disc by injuring the annulus fibrosus while performing lumbar puncture.

While this must be rare, the possibility should be borne in mind, and lumbar puncture should not be carried out as a routine in sciatica.

METHOD OF CONDUCTING THE EXAMINATION OF A CASE OF SCIATICA

Bearing in mind the foregoing scheme, I would suggest that the actual examination should be carried out as follows :-

1. The patient shouldbe examined both standing and in the prone and supine position.

(1) With the patient standing, observe whether there is scoliosis or other deformity of the spine,

whether there is muscular wasting of the buttock or limb and whether there is flat foot or other malformation leading to postural deformity. The patient is then instructed to bend forward, and any boarding of the back and its degree, is noted.

Sometimes a scoliosis which would not be evident with the patient standing, will be brought out by this means.

2. Patient supine

First the joints should be inspected for any rheumatic condition and each joint put through its normal movements. This is especially important in the case of the hip joints.

Trunk movements of flexion and rotation are now examined.

This is also a convenient time to examine the reflexes.

Lasegue's leg raising test is next carried out, as previously described, and with this is combined neck flexion. An assistant is necessary for the performance of this test.

There is another test which is sometimes of value, that is Naffziger's test. This consists in compressing the jugular veins and thus raising the intracranial and intro spinal tension. It may be done with the leg raised to the point of producing pain, in the same way as in the neck flexion test, or it may be done without raising the leg.

In disc cases, this is sometimes positive, Le Vey (1944) obtaining eleven positive results in forty cases.

3. Patient prone.

The patient is now turned face downwards and the back is inspected and palpated. A thorough search for tender areas in lumbar region, buttocks and spine, is carried out. Sacro-iliac joints are palpated, tenderness, mobility and pain are noted. Hyperextension of the trunk is attempted and limitation of movement or increase of pain may be demonstrated.

If painful areas have been found in spine, lumbar region or buttocks, an injection of 2% procaine should be given into these areas, partly as a diagnostic means and partly as a means of treatment. The rationale of this injection will be discussed later.

4. A rectal examination should not be omitted.

5. The examination should conclude with an X-ray examination of the lumbar spine and pelvis.

D I S C U S S I O N

In the introduction, I have attempted to trace the progress made in the elucidation of the causes of sciatica.

Sciatica being in itself a non fatal disease, it follows that the opportunity for pathological study does not often occur, but with the advent of operative treatment, a mass of material has been made available to visual observation. The pioneers in surgical advance have already been mentioned, Mixter and Barr (1934), Dandy (1941) and many others.

While operative treatment gave satisfactory results in a very large number of cases, there remained others in which this did not follow.

At the same time, there were many cases, apparently showing the same signs as those operated upon, which cleared up with rest and medical treatment. Was the pathology different, and in what way ?

I am not referring here to the obvious examples due to tumour growth, but rather to these two large groups of disc and fibrositic sciatica.

The evidence as given by different authorities is very conflicting, not to say, controversial.

In 1941, Kellgren stated that out of a series of seventy cases, fifty were due to ligamentous or muscular causes, and only fifteen were due to lesions of the intervertebral disc.

An Army bulletin No. 16 of November 1942, stated that the common causes of sciatica were fibrositis of fasciae, muscles, ligaments or joint capsules in lumbo-sacral, gluteal and hip regions, often associated with trauma, postural strain and congenital abnormality.

In 1942-3, O'Connell made this statement : " For if spinal tumour, tuberculous and metastatic malignant disease of the pelvis can be excluded, there remains but one common cause of sciatica, and that a protrusion of a lumbar intervertebral disc into the spinal canal, This view has been expressed by several authors - Pennybacker (1940), Dandy (1941), and Botterell (1942). It is also the view of the present author".

In 1944 also, Le Vay, in a review of Army cases, stated that nearly all were due to involvement of the intervertebral disc. He also stated that there was no evidence of sciatic neuritis.

From consideration of the above opinions, it would seem that there are two main groups of sciatica, (a) Due to disc damage, and (b) due to fibrositis of ligamentous and muscular structures.

One of the many difficulties is the interpretation of the term "fibrositis".

The name originated with Gowers, (1904), who applied it to painful states found in muscle and fasciae, and associated with rheumatism and gout.

In 1920, Stockman published his book on Rheumatism, and showed that there were changes in muscle and in fatty

fibrous tissue, which he also called fibrositis. His book was illustrated with micro-photographs of sections of theses fibrositic nodules which had been excised.

He stated that these showed the reactions of inflammation and were the result of rheumatic toxins.

Other authors, however, were unable to find these nodules, or when found, they did not show the true signs of inflammation.

Muir, (1936), gives a description of these nodules, saying that they occur in rheumatism, gonorrhoea, influenza and chronic inflammatory conditions of the throat and other mucous membranes. He also mentions the absence of signs of true inflammation, only a few lymphocytes being present in the lesions.

There is no doubt that these nodules exist, but what they are, is still the subject of considerable controversy.

Elliott (1944) in an article in the Lancet, showed that nodules in the glutal region frequently occurred in disc sciatica, and he stated that they disappeared under anaesthesia.

He made electromyographic tracings by means of connecting up a needle inserted into the painful areas, with a recording apparatus. These tracings showed that there was an electrical discharge in the affected areas, while making allowance for the presence of the needle as a foreign body.

These abnormal discharges were abolished by the

injection of 2% Procaine.

In addition, he injected an irritant solution, (6% saline), into spinal ligaments at the fourth and fifth lumbar vertebrae, and produced a referred pain and motor discharges in the upper gluteal region.

Copeman and Ackerman (1944) and Copeman (1949) demonstrated that some nodules were herniations of fat through fascia. They showed that there were definite areas of the body in which fat is deposited naturally, along both sides of the spinal column and in the upper gluteal regions. Herniation of lobules of this fat they say, may give rise to pain, and their removal leads to relief.

I have seen these herniation nodules, but they are different to palpation from most of the nodules which Stockman demonstrated, and I think that they probably account for but few of the cases of fibrositic pain.

Pugh and Christie (1945) found nodules in thirty per cent of rheumatic subjects, as compared with three per cent of non-rheumatic cases, in a group of service men.

Comroe (1944) says that nodules are present in rheumatoid arthritis in from five to twenty per cent, but the situation is not the same as in sciatica.

Demaris, Gibson and Kersley, (1948) pointed out changes in muscles in cases of rheumatoid arthritis which are described as foci of round cell infiltration.

They say that this is a manifestation of rheumatism in muscle as distinct from joint involvement.

Cyriax (1948) in an article in the British Medical Journal, concludes thus :- " Primary fibrositis, both local and generalised, is an imaginary disease. The symptoms erroneously ascribed to this condition, are the result of particular disorders, (largely internal derangements) at the spinal joints. Secondary fibrositis, (traumatic, infectious and parasitic), is a real entity ".

The problem presented in sciatica is then this: Is the fibrositic type of sciatica due to changes in the muscles and ligaments, affecting the nerve reflexly, or is it rather that changes at or near the origin of the nerve, reflexly affect the muscles, causing spasm or trophic changes in them ?.

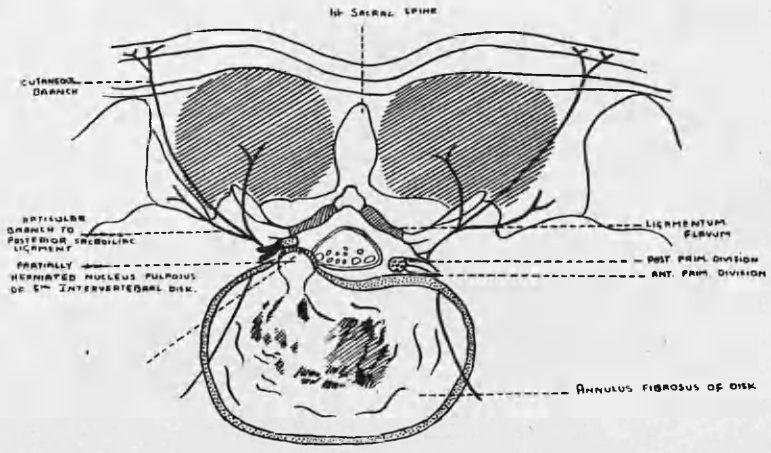
Or, may it be, that both factors operate ?.

Kellgren (1938) showed that there are various so called trigger areas in the muscles of the body, one being in the upper and outer quadrant of the gluteal area. Stimulation of this area will send referred pain down the back of the thigh, in the distribution of the sciatic nerve.

Another similar area is that of the lumbo-sacro-iliac triangle, and here stimulation produces reflex pain in the buttock, and sometimes down the course of the sciatic nerve.

A similar condition is present in the shoulder girdle. There is a trigger area in the middle of the upper border of the trapezius muscle, and pain here

FIG. 2



DISC RUPTURE SHOWING MECHANISM
OF UPPER GLUTEAL SYNDROME.
(after A. D. Leigh, M.D.)

radiates down the arm. This area too is painful in lesions of the cervical discs, 5th to 7th, and in rheumatic affections of the posterior spinal ligaments at the same level.

The commonest disc lesion here is one affecting the 6th cervical, while in the lumbar region it is one affecting the 5th disc. The symptoms produced are similar.

Leigh(1947) shows that rupture of a lumbar disc is commonest at the lumbo-sacral junction, involving fifth lumbar and first sacral roots.

Leigh states : "The first symptom of nerve compression is pain in the hip, which has been called by many names ---- the superior gluteal nerve syndrome, fibrositis, sacro-iliac strain and sciatic neuritis.

"The posterior primary dividions, of the root involved, comes up against the unyielding ligamentum flavum, producing pain in the distribution of the posterior primary division, which is in the gluteal region.

"Greater compression of the root, now involves the central portion made up of sensory fibres for the anterior primary division to the leg, hence the onset of root pains in the leg.

"The last portion to be involved, is the anterior portion, which is purely motor and produces paresis or paralysis . "

This seems a logical explanation for the pain in the buttock, often referred to as fibrositis. As a rule, the pain in the initial stages of sciatica is felt there, spreading later to the leg and perhaps foot too.

On the other hand, rheumatoid arthritis and allied conditions may produce nodules in this area, which is also a trigger area.

Can antidromic impulses originating in this area be referred back to the spinal roots and down the next division which supplies the leg ?.

I think that this is a possibility, but that Leigh's explanation seems the more likely.

Disc lesions are not common in the young, but in the intermediate age groups they are common. In this latter age group, chronic rheumatic disease makes its appearance.

It is likely that some such diseased condition, which as in rheumatism affects fibrous tissue, will also affect ligaments and discs, which are formed largely of this type of tissue. Thus we have discs which in young people are subjected to strain without rupture, yet in the older groups rupture easily. It may be that the strains and trauma of youth initiate the degenerative processes which lead to this later rupture.

Kellgren (1941) attempts to distinguish between fibrositic and disc sciatica by the response to injection

of solutions of Procaine.

He states that sciatic pain which is abolished, (perhaps temporarily), by injection of Procaine into spinal ligamentous trigger areas at 4th and 5th lumbar level, has its origin at that site. However, injection into the area of referred pain in the buttock, also abolishes the pain, so that it is difficult to be sure which site is the causal one.

This painful area in the buttock is present in disc lesions as well as in arthritic lesions in the 4th and 5th lumbar region, so that Leigh's explanation would seem the more likely.

Lasegue's sign too disappears when the upper and outer quadrant of the buttock is injected with an anaesthetic solution.

If, as O'Connell (1942) maintains, Lasegue's sign is due to increased tension on the dural sheaths of the spinal theca and roots, why does it disappear when the painful area in the buttock is injected ? .

I think that this shows that Lasegue's sign depends partly on spasm of the glutei, which causes extension of the leg to be resisted.

The spasm is reflex to a lesion in the spine as Leigh has pointed out, and by abolishing this spasm, extension becomes painless and full.

With many others, at one time I thought that this relief from pain, showed that the lesion was in the buttock, but now I think that the explanation given by Leigh is the correct one.

Kellgren himself thought more in terms of fibrositis of the muscles, but (1941) admits that explanation is not simple.

It is also true that simple strain of the hamstring muscles will hamper full extension of the leg, and that in the elderly, full extension is rarely possible or at least free from discomfort. Thus, Lasegue's sign is not by itself diagnostic of disc lesion, but is frequently present when there is a lesion of the disc.

Lumbar rigidity with tenderness over the lower spinal processes, together with lumbar scoliosis and neurological signs, forms a picture practically diagnostic of disc lesion.

The chief neurological changes are, disappearance or diminution of the ankle jerk, hypoaesthesia and paraesthesia of the leg, lack of muscular tone and power in the affected limb.

With slight involvement of the nerve trunk by the disc, we find the upper gluteal syndrome with little or no change in the extremity, while with more severe pressure signs appear below the knee. The ankle jerk is diminished or may disappear and there are alterations of sensation together with loss of power.

As the sciatic nerve is derived from five different roots, it follows that involvement of one or different combinations of roots will prdduce different symptom complexes. This leads to quite a different appearance from that of a neuritis, in which the nerve as a whole would be affected and where loss of power and trophic

changes would be much more marked.

Affection of the cells in the anterior horn of the spinal cord would also lead to flaccid paralysis in the first place, as in Poliomyelitis.

This appearance is not seen in ordinary sciatica.

The picture presented by neuritis due to lead, arsenic or diabetes is also quite different from that of sciatica due to disc damage, the toxic neuritis being usually more widespread, flaccid, and not limited to a single limb. Indeed, it is typical of sciatica that only one lower limb is affected, and any departure from this leads to suspicion that a tumour growth may be responsible for the picture.

It is relatively common to find involvement of perhaps the first sacral root with paraesthesiae of the outer side of the foot and leg, without any visible changes in the other parts of the limb. Such a picture would not be presented by a neuritis of the sciatic nerve as a whole. LeVay (1944), in a review of forty cases, says that there were no cases of sciatic neuritis.

The objection is sometimes raised that cases occur in which a septic focus, such as a bad tooth appears to cause symptoms of sciatica, and it is argued that this must be a neuritis.

There is no doubt that such cases occur, but the condition is not a neuritis., These cases occur where there is already involvement of the spinal root by an inflammatory process in the region of the disc and perivertebral soft tissues, possibly osteoarthritic, and

the septic focus merely acts by activating this process of inflammation.

The removal of the septic focus sometimes leads to dramatic improvement.

The same explanation applies to increase of pain due to damp and to weather changes, which affect fibrous tissue principally.

O'Connell (1942) gives a reasoned account of the mechanism by which a disc lesion causes sciatic pain. He states that the nerves in the Cauda equina are freely movable, but as they leave the theca the dural sheath is firmly bound down and non-extensible. Neck bending, Lasegue's manoeuvre and forward bending all increase tension in the rigid dura, and this readily explains the increase of pain when these movements are performed.

If this is so, why do the majority of sciaticas improve spontaneously if disc pressure is the cause? O'Connell (1942), has pointed out that the nerve may be stretched upon the apex of the disc protrusion, and that displacement of the nerve to either side of the protrusion may occur, with disappearance of the pain.

This probably accounts for the intermittency of symptoms, which is such a well known feature of sciatica and also for the success which sometimes attends manipulation.

On the other hand, he also points out that a nerve under tension, will gradually stretch, so that in time tension is relieved and pain either diminishes or may

disappear.

The bodily posture of semiflexion is the position of least tension, this being the position adopted by the patient if left to himself, and some surgeons make use of this when fixing the patient in plaster.

There is however, the disadvantage that this flexed position is not the one adopted by man in walking, and I think that a compensatory position of lumbar extension is better in treatment, the pain being controlled by suitable analgesics.

I think that I have said sufficient to account for the mechanism by which disc rupture and so called fibrositis may cause sciatic pain, and have shown that the two conditions may be virtually one.

Admittedly, cases are met in which no rupture of the disc is found at operation, but in some cases, Dandy, (1941), demonstrated what he called concealed discs. By this he meant that the nucleus pulposus was necrotic and that the inflammatory process involved the nerve roots either by the inflammation itself or by subsequent adhesions.

In the case of the knee joint, a very small positional change in the interarticular cartilage, leads to extensive effusion and widespread pain.

The disc is well supplied with pain receptors, and it is not difficult to picture a similar condition in the lower spinal region also.

OTHER CAUSES OF SCIATICA.

Pyriformis Syndrome.

In 1928, Yeomans first drew attention to the possibility of pressure by the Pyriformis muscle upon the nerve trunk, as a cause of sciatica, and in 1937, Freiberg studied the anatomical relations of this muscle with reference to sciatic pain, in a large number of cases.

Robinson (1947) in an article in the American Journal of Surgery, described two cases where Pyriformis pressure caused sciatic pain, and in which section of the muscle removed the pain and sciatic symptoms.

It will be remembered that in ten per cent, the sciatic nerve piercesthe pyriformis muscle in order to leave the pelvis. In the remaining ninety per cent the sciatic nerve is crossed by the pyriformis.

It is postulated that where trauma, such as a fall on the buttock, causes injury to the pyriformis, sciatica may result.

The differential diagnosis involves exclusion of disc lesions, and the discovery of tenderness and perhaps swelling in the region of the pyriformis muscle. Robinson (ibid), says that acute exacerbations of pain are caused by stopping, and relieved by traction on the affected leg.

Lasegue's sign is positive, and a sausage shaped mass is found in the region of the pyriformis when movement produces pain. Gluteal atrophy may also occur

in long standing cases.

Fletcher, (1946), also recognises this condition and quotes twenty cases treated more or less successfully by injection of procaine into the muscle.

Fletcher gives the following instructions for injecting the Pyriformis muscle :- " The injection is carried out with full aseptic precautions. The best position for the patient is to lie on the unaffected side with the upper thigh somewhat flexed.

"The upper border of the great trochanter is outlined with a skin pencil, and the posterior superior iliac spine is identified and marked.

"The two points are joined. From the mid point of this line, a perpendicular is dropped at right angles. One and a half inches down this line marks the exit of the sciatic nerve from the pelvis. A point slightly above this (three quarters of an inch down from the perpendicular) marks the site for the injection of the pyriformis muscle.

"The needle is inserted at this point and pushed forward at right angles to the skin. At a depth of about five centimetres the bone is usually reached. The needle is slightly withdrawn and ten ccs. of 1% procaine solution is slowly injected.

"In cases where the pyriformis muscle is at fault, the sciatic pain will be relieved for several hours. "

OSTEOARTHRITIS.

In the elderly, osteoarthritis is a common condition, and X ray reports frequently indicate its presence in the spine and hip joints.

A feature of osteoarthritis is its tendency to exacerbations due apparently, to climatic changes or to unaccustomed excerise on the part of the patient. It is not likely, unless the spondylitis is of a very marked degree with gross osteophytic changes, that the spinal roots would be involved directly, but the inflammatory reaction set up, may involve the fibrous tissue of ligaments and discs with resulting adhesions.

I think that this is a relatively common cause of sciatic pain in patients over fifty years of age, especially in labourers and gardeners, both amateur and professional. Occasionally cases are met in which it appears that an osteophyte may become loose and cause locking of the lumbar spine in much the same way as that in which a ruptured disc acts.

In the osteoarthritic type of sciatica however, neurological signs are few, owing to the fact that there is not, as a rule, sufficient pressure on the spinal roots. The extent of the pain is also less than in disc cases, being mainly confined to the lumbosacral and gluteal region, and rarely spreading beyond the knee.

Arthritis of the Hip.

Pain from arthritis of the hip should not readily be mistaken for sciatic pain, the hip joint being one of

the easier joints to investigate clinically.
Hip joint pain is usually experienced in the joint itself, in the groin, and is referred down to the knee.

Limitation of movement on external and internal rotation, together with, in advanced cases, movement of the pelvis on flexion of the thigh upon the trunk, usually make diagnosis plain.

There is often however, arthritis of the hip associated with spinal changes, but in that case, sciatic symptoms are due to the latter.

NEUROFIBROMATA OF THE SCIATIC NERVE.

Neurofibromata of the sciatic nerve have been known to occur, but I have no actual experience of them.

Muir, (1936) shows a specimen involving the sciatic and many of its branches. He says that they originate from neurolemma cells.

It is not likely that they would be diagnosed, except tentatively, without operation.

MECHANISM OF INTERVERTEBRAL DISC RUPTURE.

In the notes on the anatomy of the intervertebral disc, I have mentioned that the disc is exposed to very varying degress of tension according to the position of the spine and the movements which are performed both in different forms of work and the normal bodily functions.

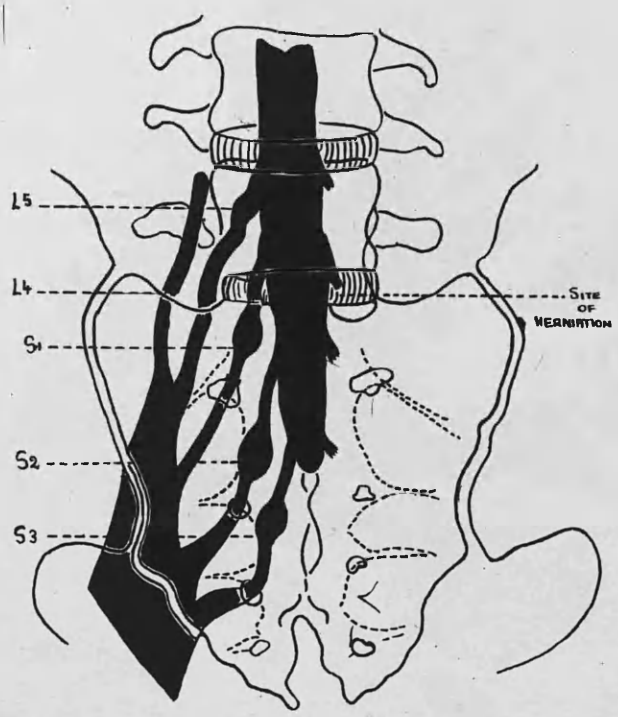
The pressure on bending and lifting weights is as much as ten times that when the spine is at rest, and the degree of pressure will also increase with the amount of weight carried. It is rare that a weight lifting action is performed with the back muscles used equally. There is usually an increased muscular effort exerted by one side more than the other. In a right handed person, the muscles on the right side of the spine are used to a greater extent than those on the left and vice versa, so that still more is pressure brought to bear on one side of the disc more than on the other.

The postero-lateral border of the disc is relatively less supported than any other part, especially in forward flexion of the spine, and yet it is exposed to the same, if not more strain in weight lifting. For this reason, it is not surprising that rupture or protrusion of disc contents takes place principally at this site.

In the young, strains of this kind are relatively well borne, owing to the healthy and elastic nature of the fibrocartilage, but in the middle aged and elderly, degenerative processes have had time to produce their effects, so that the frequency of disc damage in the later age groups is not surprising.

As Leigh 1947, has shown, this postero-lateral rupture presses upon the nerve trunk proximal to the root ganglion, in the first place, so that sensory power may be lost for a very long period or paraesthesias

FIG. 3



DRAWING MADE OVER ROENTGENOGRAM TO SHOW RELATION OF FIRST SACRAL AND FIFTH LUMBAR ROOTS TO INTERVERTEBRAL DISCS. (with acknowledgment to A. D. Leigh, M.D.)

may persist long after the case has apparently recovered. The anatomical distribution of the nerve trunks and their liability to become involved by pressure is well shown in Leigh's diagram.

It may be argued that the actions which lead to disc protrusion may be so trivial that it is difficult to believe that they are the actual cause of the rupture. It appears that it is more the type of movement and the state of the disc together, rather than the actual degree of strain which leads to the accident. At the same time, I believe that sometimes there is no actual protrusion of the disc, but rather an inflammatory swelling, due to osteoarthritic changes in the structures round about, and that this by stimulating the pain receptors in the disc, which are numerous, produces the sciatic pain. This is likely to be true of those cases of sciatica where the pain is greatest in the buttock and of less extent in the thigh, and also where there are no reflex changes. These are the cases in which recovery is rapid and which are frequently attributed to "fibrositis".

Where, however, the case is more prolonged, adhesions caused by the inflammatory process may be responsible, as suggested by Dandy, (1941).

The rupture of a disc takes place in similar circumstances to, say, the fall of the Tay Bridge. There was a weak place in the bridge which was ready to give way under a sufficient strain. Had the weak spot

not been there the accident would not have occurred. The weak place in the disc is furnished by degenerative change, and is thus prepared for rupture.

In addition to this, the part of the spine exposed to strain is also the part where there is a transition from a relatively static condition as in the sacrum, to the actively moving lumbar spine. Thus search for the defective region is limited to the last three lumbar interspaces and more usually to that between fifth lumbar and ascrum. For this reason it is usually unnecessary to make use of intra thecal injections of contrast media for diagnostic purposes.

PERSONAL INVESTIGATIONS.

A series of fifty cases is described. These cases were collected as they came to the out-patient department of Dundee Royal Infirmary, Dundee Orthopaedic and Rheumatic Clinic, and from general practice.

Social Conditions.

These cases were drawn mainly from working, labouring and better working class people. A few were what might be called middle class, but with the general levelling of the social order, it could not be said that there was any sign of poverty or of riches as a factor in the production of sciatica.

SEX:

The sex ratio shows an unusually large number of female patients, 40%.

This is probably accounted for by the social habits of Dundee, in which female labour has always played a large part.

Many of the cases shown as housewives, also worked in varying degree in the jute factories or other industries, marmalade manufacturing, book-binding, etc., and others worked outside their homes as part time domestic workers. In addition, many women work in the factories during pregnancy and up to a comparatively short time of parturition. It seems probable therefore,

that the changed body mechanics due to pregnancy, relaxation of ligaments, and altered carrying angle of the spine, must play a part in spinal strain, which in turn may lead to disc prolapse.

OCCUPATION:

Female; House wives, including domestic workers numbered seventeen cases. There was one weaver, (jute) one dress cutter and one clerkess.

Male; Of the males, 34% were engaged in heavy, labouring work and 6% were engaged in the motor trade either as drivers or cleaners.

It is my impression, though not shown by the present series of cases, that the motor trade owing to the character of the work has an unusually large number of cases of sciatica. The driving position in some cars leaves a great deal to be desired, and predisposed to chronic low back strain.

Other occupations included, clerks, (3) firemen (1), night-watchmen (1), slaughterhouse manager (1), waterworks attendant (1), painters (1), infirmary porter (1).

AGE INCIDENCE:

The age ranged from seventeen to sixty eight years, giving an average age for all cases, of forty-four years. O'Connell gives the average age in his cases as thirty-five. It is clear that this is an age period of activity, but in addition degenerative changes are beginning to make their appearance. We are passing from the age of rheumatoid to that of osteo-arthritic change in mesodermal

tissues. In the female too at this age, the stresses of pregnancy and parturition are more marked than in the younger age groups.

PREVIOUS HISTORY:

There was a previous history of trauma or former rheumatic symptoms, lumbago or low back pain, in sixty per cent of cases.

The onset was gradual in sixty two per cent, and sudden, that is, a definite time of onset was noticed, in 38%. Of the latter, 8% reported major trauma as from accidents or heavy falls. A common feature in cases of sudden onset, was severe pain on rising from a stooping posture. A patient washing the face, on straightening up from stooping over the wash-basin might find that his back was "locked", and later pain appeared in the hip and spread down the back of the thigh.

The stooping posture opens out the spinal joint spaces and allows disc prolapse to take place, subsequent straightening of the spine is then rendered both painful and difficult.

This tendency to prolapse in the stooping posture is greatly increased where the patient is engaged in lifting heavy weights, the intra-disc pressure being much higher.

The strains of youth, games, etc., may weaken ligamentous and disc structure and rheumatism certainly weakens the annulus, so that renewed strain will the more readily predispose the rupture. It is also

possible that in some of the cases of locked back, an osteophyte may be responsible as it is in cases of locking of the knee.

VARIETIES OF SCIATICA.

Disc, or probable disc cases numbered twenty-four, or 48% of all cases.

Four of these cases were operated upon, and the findings of disc rupture was confirmed. Disc damage is therefore THE major single cause of sciatic symptoms in this series.

Non disc cases;

These numbered twenty-six, or 52%. Some of these cases may also have been discs, but only the most severe cases were included in the category of disc.

In this section,are included, tumours of the pelvis, (1) diabetic neuritis, one case, herpes,(1), sacralisation of last lumbar vertebra,(1) and osteo-arthritis of the hip, (1).

The remaining cases are classed as spinal, and in the main, show secondary fibrositis of lumbar and gluteal muscles.

SYMPTOMS:

The main symptom, was pain in the region of the sciatic nerve in part or whole, in varying extent.

Gluteal pain was noted in 80% of all cases, with tenderness to pressure in the upper and outer quadrant of the gluteal muscles.

In the great majority of cases pain was limited to one leg only, but in two cases there was pain in both

legs, though much less in one than in the other.

Of those cases in which there was no gluteal pain, some complained of pain in the lumbo-sacro-iliac triangle, (4 cases). One was due to a tumour of the pelvis, and pain was felt in the sacrum and legs.

Two had sacro-iliac pain and tenderness. There was one case of diabetic neuritis, one of osteoarthritis of the hip, one of short duration where the sciatic pain was minimal, and one complained of para-spinal pain.

TYPE OF PAIN:

The character of the pain varied greatly, being much more severe in disc cases. In the disc cases, not only was the pain more severe, but it spread over a greater extent than in the fibrositic type of case.

In the former, the whole extent of the sciatic nerve appeared to be involved, the outer side of the foot in the lower discs, and the heel and sole of the foot in those slightly higher up. Upper gluteal pain was common in both varieties, and was accompanied by deep tenderness.

Paraesthesias were common in disc cases, and this was frequently accompanied by objective coldness in leg and foot.

Symptoms appeared to vary as regards time, nearly all acute cases showed marked increase of pain at night.

Coughing and sneezing appeared to accentuate pain, especially in disc cases.

Movements. Trunk movements were little affected as regards rotation, but forward bending of the lumbar spine

with inclination to one or other side was limited and painful, and boarding of the lumbar region was common in disc cases especially.

Except in the mildest cases and those of short duration, there was practically always muscular hypotonus in the affected limb while in those cases of long duration and severity, muscular wasting was marked.

Wasting was most marked in the gluteal region, though also seen in the posterior aspect of the thigh and calf. The wasting persisted for a long time after pain had subsided.

In those cases where peroneal muscle wasting was seen, a partial drop foot frequently developed, leading to a flapping sort of gait.

Walking also tended to produce fatigue and numbness in the affected leg in most severe cases, especially when on pavements and hard ground.

Patients reported that they could walk much further on grass than on hard roads. This may be attributed to the jarring effect on disc and ligamentous structures, and is partly prevented by the patient wearing rubber heels on the shoes or by wearing sorbo rubber pads; inside the shoes.

GAIT:

There was no gait which could be called diagnostic of sciatica, though many cases tended to walk with a stiff back, slight forward stoop and scoliosis to one or other side, the pelvis being tilted in order that too much weight should not bear on the affected leg.

NERVOUS SYMPTOMS:

By this, I mean neurosis. I have not been struck by the nervous element in the cases under review. In this class of patient, mainly working and better working class, pain is usually better borne than in the lower and slightly higher social class, at least, that is my impression.

Only one case, a middle class housewife, who had recently become a widow, showed definite hysterical symptoms. But she responded particularly well to injection of Procaine probably on that account in part.

At the same time, my impression is, that patients undergoing prolonged massage and physiotherapy, tend to acquire a liking for it and their recovery tends to be protracted. For that reason I tend more and more to encourage the patient to carry out his own exercises and without too much insistence on so called "rehabilitation".

Neurosis is to be suspected where a case shows a marked Lasegue sign and yet can sit up easily in bed with the legs straight.

SIGNS:

Muscular wasting has been included under the heading of symptoms, because, not only is it an objective sign, but also that the patient complains of it. , As a rule, muscular wasting in the gluteal region occurs along with tenderness in that situation, and in the cases under review, was present in 80% to a greater or lesser extent.

The most constant sign was undoubtedly that of

Lasegue. This was present in 80% of cases.

It is stated that a Lasegue's sign, positive, elicited at an angle of 40 degrees or less, indicates a severe case, and one which will clear up slowly. With this statement, I am in agreement, and I think that, especially in disc cases, is this true.

I have been impressed with the fact that Lasegue's sign can very readily be abolished by injection of a solution of Procaine into the upper and outer quadrant of the gluteal region; at least temporarily, especially when there is coexistent tenderness in that region.

It will be remembered that this area is supplied by the posterior sensory root of Lumbar 4 and 5, and it is possible that by blocking this painful arc, that this result is obtained; but as is pointed out by Kellgren, explanation is difficult.

The fact remains that this effect is possible, and produces a very favourable impression upon the patient, who previous to injection could not allow his leg to be raised, except perhaps to an angle of 30% , and who a few minutes later sees that without pain, it may be raised to a right angle.

In evaluating Lasegue's sign allowance must be made for the fact that in elderly patients straight leg raising is sometimes difficult owing to changes in muscular and tendinous structures.

If this is borne in mind, there is no doubt that this sign is of the greatest value in the diagnosis of sciatica.

REFLEXES:

Knee jerk;

In only two cases has there been loss of the knee jerk, cases 30 and 45. Taking case 45 first; this was a case of "anterior sciatica", in which the lesion was apparently in the third disc. The other case, no. 30, was one of diabetic neuritis, in which the loss of the knee reflex was not unexpected. In all other cases, the knee reflex was unaltered, except that in a few cases, the "glib" response described by Fletcher (1946) was seen. This appears to be due to loss of tone in the synergist muscles, rather a manifestation of actual nerve trauma.

Ankle jerk; In 68% of all cases the ankle jerk was found to be unaffected.

Of the remainder, those affected, 16% showed a diminished response on the affedted side, while in 4% there was no response in both legs.

When this reflex is altered or lost, it is justifiable to assume that there is definite interference with the nerve root at the level of 1st and 2nd sacral segments, and most probably a disc lesion between lumbar 5th and sacrum. That is, making allowance for toher conditions such as Tabes etc., In the so called fibrositic sciatica, there is no loss of ankle jerk, even when there is a marked degree of muscular wasting.

Purves Stewart (1931) tries to distinguish between sciatiaa neuritis and radiculitis, saying that in sciatic

neuritis the ankle jerk may be diminished or lost, but that is the neuralgic form the reflex is retained.

This observation may be true in the case of neuritis, if it exists as a spparate entity, but the extent of pressure on the nerve root, and its situation, will determine whether the ankle jerk is present or not.

The loss appears to indicate pressure or interference at the level of sacral 1st and 2nd, and the gravity of the pressure will govern the extent of the loss or diminution.

BLADDER AND BOWEL SYMPTOMS.

In only one case has there been complaint of bladder disturbance, (case 27).

In that case, disturbance of function was limited to occasional stress incontinence. Whether this was due to other causes, is not easy to say. In none of my cases has the patient complained of shaped stools or anal spasm.

BRUDZINSKI'S NECK SIGN:

This sign was not carried out in my earlier cases, but in the second half of those reported on, it was fairly frequently present in disc cases.

Increase on jugular pressure, was present in four cases only.

SENSORY DISTURBANCES:

Subjective sensory disturbances have been common. Apart from pain, which is common to all, tingling and numbness have been complained of in all disc cases.

In the lower discs, the outside of the lower third

of the leg, and dorsum of the foot, has been the site of this form of sensory disturbance, while in the case of discs four and five, the back of the leg and heel seem to be chiefly involved.

In the fibrositic type of case, the patient seems more often to complain of occasional shooting pains, worse on movement, affecting the foot, but more vaguely and not a persistent paraesthesia.

Numbness, however, in my cases has been more common, but in an indefinite way and in most cases could not be accurately defined.

Actual objective sensory changes I have not been able to find.

In a few cases, the leg and foot on the affected side have felt distinctly colder than the sound leg, but there did not appear to be any actual loss of sensation to light touch or to pin prick.

SNEEZING AND COUGHING:

Sneezing and coughing, which are sudden involuntary movements, sometimes increases the pain of sciatica. But I think that this is common to all types of sciatica and not diagnostic of disc lesion, though as pain in disc cases is generally severe, increase by these move-:ments is likely to cause increase of pain more readily.

X-RAY FINDINGS:

It is a striking fact that in the vast majority of cases of sciatica X ray findings are negative. As would be expected gross lesions of the pelvic bones and spine due to tumour growth, are readily seen, but in the

common type of sciatica, little abnormal is evident.

Occasionally a diminution of intervertebral space on one side, is seen, but the findings, even in well marked disc cases are usually little different from the normal. In case 27, confirmation of tumour growth of sacrum was obtained, the condition having been diagnosed clinically.

Naturally, abnormalities of development and displacements of articular processes are readily seen radiographically, and one case of sacralisation of the fifth lumbar vertebra is included in this series of cases.

The presence of osteoarthritic changes in the spine occurs so frequently that it is difficult to avoid the conclusion that this condition has something to do with the production of sciatica. Disc changes are more likely to occur where degenerative processes are at work, leading to weakening of the annulus and predisposing to prolapse of the nucleus pulposus.

Postural deformity is also likely to occur with spinal and hip joint osteoarthritic change, and is readily observed on X ray examination.

Even allowing for the infrequent positive findings, it is essential that every case of sciatica should have an X ray examination of the lumbar spine and pelvis.

POSTURAL DEFORMITY:

In any case of sciatica which has persisted for a time, postural deformity is likely to be found. Due to the bending of the knee and pointing of the toe on the affected side, it is usual for the pelvis to become tilted.

In sedentary occupations, such as clerking, tilting of the pelvis with lateral flexion of the lumbar spine is a common finding.

Recently, in a case, not included in this series, that of a girl of eighteen years of age, sciatic symptoms persisted in spite of rest in bed and other measures, but disappeared rapidly when the heel on the affected side was raised by half an inch. This girl's occupation was that of a book-binder, in the course of which work she sat most of the time on a stool, and bent to one side. In this thesis I have laid emphasis on maintaining the lumbar curve, and in the rehabilitation of sciatic patients exercises designed to strengthen the back muscles are of great value.

In this series of cases the proportion of women is higher than usual and, as already stated, the employment of women in industry in this region is probably a factor. In addition, women's work in the home frequently causes postural strain; standing at wash tubs, many of which are at an unsuitable level, added to the strains of pregnancy and carrying of children.

Unsuitable footwear accentuates lumbar strain. At one time a woman may wear high heels and at another she may change to low heels or no heels at all. The combination of some of these factors will readily produce low back strain and predispose to rupture of an already weakened disc.

In considering treatment all these contributing factors will have to be taken into account, the omission to do so may delay recovery.

TREATMENT:

My experience has been that all but a few cases of sciatica will improve with medical treatment. Of the fifty cases reported in this series only four cases were operated upon and one case (No.39) was only treated by surgical means because of the insistence,by the patient, on this form of treatment. In this case surgery was only partly successful as, shortly after operation, the patient began to complain of pain in the gluteal region of the opposite side. Case No.1 suffered such severe pain that operation was considered early, and in her case operation was successful in allowing her to resume full household duties. Both other cases operated on did well and were able to resume their usual work, one as a blacksmith and the other as a gardener.

Thus in the limited number of cases treated operatively, three have done well and the other moderately.

In the disc cases treated by medical means results have not been less successful than in those treated surgically, Medical treatment requires a considerable amount of patience at times, but persistence is often rewarded as is shown in two of my cases where, in the original report, I suggested that they would eventually come to operation,this proved not to be the case, and both made excellent recoveries without surgical interference.

One case (No.48), treated by extension plaster, made a complete recovery, and the other case (41), though slow, was able to resume full work after about two months rest in the position of maximum rest (Farkas) and graduated exercises after being allowed up.

There is no doubt, however, that the class of work and the mental make up of the patient have to be considered when carrying out treatment.

Where the patient is of an impressionable type, undue emphasis on physical therapy seems to prolong the process of recovery. The patient appears to look upon the routine of an orthopaedic clinic as part of his life work and seems to feel deprivation on the remedial exercises coming to an end. It is well in these cases not to be too technical in explanation of the patient's ailment, otherwise, unwittingly, a false idea of the gravity of the illness may be given and wrongly interpreted.

At the same time, where a patient is engaged in a heavy occupation, such as a harbour porter, it would seem wiser to persist with medical and orthopaedic exercises, rather than to submit him to surgical interference, which might weaken the skeletal supporting mechanism of the spine. In the case of heavy occupations such as this it might be well to seek lighter work if possible.

It is sometimes stated that the duration of a case of sciatica before treatment is begun does not affect the course of treatment. I do not agree with this at all, and feel that the sciatic patient cannot be rested too soon. Too often patients are sent up to the out-patient department with a request for electrical treatment, who have not been rested at all and who, if treated in this way, will continue almost indefinitely with their massage without much improvement. If these patients had been put to bed in complete rest in the early stages, before postural deformity occurred,

duration of their incapacity would have been much shortened.

A full general examination, including X ray of lumbar spine and pelvis, should be undertaken before treatment is begun, and the type and possible cause diagnosed. Only then can a rational line of treatment be carried out.

DETAILS OF TREATMENT:

In sciatica of any severity, from whatever cause, we confine the patient to bed, usually for a minimum period of three weeks.

I prefer to employ the dorsal decubitus, with a firm pillow in the lumbar concavity, and recently I have adopted the "position of maximum rest" described by Farkas, which has already been mentioned. This involves raising the foot of the bed about twelve inches or more. Patients at first do not like this position owing to the head being low, but after a little they find that the improvement produced by it, more than makes up for the passing discomfort.

A pillow placed under the knee of the affected leg frequently gives relief by releasing tension on the nerve trunk and root.

If there is tenderness in the lumbo-sacro-iliac triangle or in the more usual site in the upper and outer quadrant of the buttock, this should be injected with Procaine or allied substance.

I have used solutions of varying strength, ranging from ½% to 2% Procaine.

Probably the 1% solution is the most suitable, for not only the strength but also the quantity seems to be of importance. The larger volume appears to exert a mechanical

disruptive effect, especially in the lumbo-sacro- iliac triangle. Whether this is the explanation, it is difficult to be sure, but my impression is that the effect is superior to that of the stronger solution and less bulk.

In a few cases I have combined the more rapidly acting aqueous solution with a later injection of the longer lasting oily solution, Protocaine, and I think that results have justified this method.

This combined injection gives good results in the out-patient department in cases where the acute stage is past, and allows remedial exercises to be undertaken in addition, while the patient is at the infirmary.

ADRENALIN:

The anaesthetic solutions should not contain adrenalin as,owing to the size of these injections,the quantity of adrenalin may be considerable, and side effects of this substance may be seen. These side effects consist of dizziness, tremors and even faintness.

No serious effects have been seen in any of my cases where adrenalin has been used, but tremors and faintness cause alarm in the patient, and for this reason, I have abandoned the use of injections containing this substance.

I have no doubt that Procaine injections are a most valuable adjunct to treatment, even in disc cases, and definitely cut down the duration of the illness in most cases, and reduces pain, at least temporarily, in nearly all.

MASSAGE:

I have tended to use massage less than formerly, having come to the conclusion that the painful nodules in the

buttock and elsewhere are not usually the cause of the sciatica, but are secondary to lesions in disc or spinal structures, such as, ligaments.

That being so, massage is not indicated, except from the point of view of relieving spasm, though it must be admitted that in very stout women with panniculitis, massage does help.

REMEDIAL EXERCISES:

When the acute pain has gone and the patient is allowed up, remedial exercises have been employed, especially those directed at preserving the lumbar curve and correcting faulty position.

Where scoliosis has developed, as it does, especially in cases which have not been rested at the start, suitable orthopaedic measures, such as, raising the heel and sole of the shoe are undertaken.

The patient is instructed in standing and sitting, and forward bending is discouraged. When stooping is called for, the squatting position is substituted for it, the lumbar curve being preserved at all times.

The height of the heels should be kept the same at all times, that to which the patient is accustomed, being worn from the time of getting up to the time of going to bed

ELECTRICITY AND LIGHT THERAPY:

Too much is often expected of this form of treatment.

In the early stages when pain is acute heat in any form often seems to increase the pain. This depends on the individual patient, however, for in some cases Infra-red treatment will allow spasm to relax. Certainly, in the later stages, Infra-red rays will prove a useful forerunner to massage, when indicated.

I do not think that Diathermy, either short or medium, wave, has any effect on ordinary sciatica unless there is present at the same time osteoarthritic changes in spine or hip joint, and even then treatment is likely to be prolonged. Certainly in the acute phase of sciatica, diathermy has no place in treatment.

MANIPULATION:

Occasionally manipulation may succeed where more conservative methods do not appear to be successful. In disc cases, however, great care must be taken as a further and greater displacement might lead to disaster in the form of a cauda equina lesion. For this reason I do not employ an anaesthetic in manipulation. In the so-called fibrositic sciatica where involvement is confined to buttock and thigh, a simple rotational manipulation of the trunk frequently gives the patient a sense of loosening of the low back spasm, but it is more in the nature of chance than of certainty. In spite of this, a mild non-anaesthetic manipulation is worth trying once.

PLASTER CASING:

In an intractable case of sciatica which appears likely to come to operation, plaster fixation in a spinal jacket carried well over the hips, may be tried first. In one of my cases (48) this was very successful.

Some surgeons make use of the anterior flexion position in plaster casing. I do not think that this is fundamentally sound, for though it affords, possibly, speedier relief from pain than the extension plaster, the position of flexion may be difficult to get rid of after the plaster is removed.

I believe that preservation of the normal lumbar curve is of the greatest importance in maintaining the upright posture.

DRUGS:

The part of drugs in treatment of sciatica is confined to that of relief of pain. From the patient's point of view this is of major importance. It is rare that morphia should have to be used, and usually a combination of Aspirin, Phenacetin and Caffeine Citrate in adequate dosage is sufficient to tide the patient over the acute stages.

In very severe cases, Pethedine or Physeptone, B.W. & Co have the advantage that they may be given by mouth, but the need to use such drugs but rarely arises.

DURATION OF TREATMENT:

With treatment, as indicated above, the acute stage of sciatica should usually be over in about three weeks. The complete recovery, however, may take a very much longer period and residual weakness may last for months and even years in severe disc cases. Recurrences are fairly common, but if attention is given to the preservation of the lumbar curve and correct posture, this should not happen so frequently.

TREATMENT CONCLUSIONS:

Treatment in the majority of cases is Medical. Surgery is reserved for the small number which do not respond to the treatment as outlined above. I am in agreement with Mr. Hubert Wagner of Pittsburg, when he says "Operation in the last instance, instead of the first."

C A S E S.

1. Mrs. A.T., Dundee Age 44. Housewife.

About June 1946, this patient developed pain in the back of her left thigh, made worse on movement and on rising from a chair.

The pain gradually became worse and on 16/7/46 she came to the Out-patient department of Dundee Royal Infirmary.

Examination:

A well nourished woman with no previous illnesses of note. Complains of pain and tenderness in left thigh and numbness of the outer side of her left leg and foot. There was some flattening of the lumbar curveand slight impairment of flexion of the trunk.

Joint movements were normal and free at ankle, knee and hip but pain was experienced in the Lumbo-sacral triangle on hyper-extension of the lumbar spine. A tender area was made out in the upper and outer quadrant of the left Gluteus muscle, and there was tenderness down the course of the left Sciatic nerve. There was loss of tone and slight wasting of Gluteus and the muscles of thigh and leg.

Reflexes:

There was no disturbance of bladder or bowel. Arm jerks, Abdominal and Knee jerks were normal, though the left Knee jerk was rather more brisk than the right. The left ankle jerk was diminished and the plantar

reflexes were flexor.

No sensory changes were made out though the patient complained of tingling and numbness in the outer side of the left foot. Rectal examination was negative.

Straight leg raising:

This was reduced to 50% of normal and Lasegue's sign was positive. Pain was increased on coughing or sneezing.

X-Ray Examination:

"No bony change or evidence of disc".

25/7/46 10ccs. of 2% Novocaine were injected into the left upper and outer quadrant of Gluteus on the affected side and within ten minutes extension of the thigh on the trunk was complete and painless, and the patient was able to walk comfortably.

27/8/46 Patient still complains of pain down the middle of the thigh posteriorly. Tenderness now limited to small area in Lumbo-sacral-Iliac triangle. The ankle jerk was still much diminished. Pain still made worse on coughing or sneezing, and Lassegue's sign was still positive.

The patient was seen in consultation with Mr. Campbell F.R.C.S. who agreed that the signs pointed to a disc lesion, and her name was placed on the waiting list for operation. Meanwhile she was to rest at home and have symptomatic treatment by her own doctor.

1. Mrs. A.T., Dundee (contd).

3/1/47. Admitted to Ward 7, Dundee Royal Infirmary, under the care of Mr. Campbell.

7/1/47. Mr. Campbell removed lamina of fifth lumbar vertebra but owing to bleeding the operation was stopped.

27/1/47. Old incision was re-opened. Left spinal root seen with portion of disc pressing backwards on it. Disc showed large cavity and was removed in pieces.

31/1/47. Still some pain and numbness in left leg and pain in the back.

16/2/47. Very much better, walking well - discharged home.

Comment. In this case there was no history of injury to the back. The limitation of extension and flexion of the lumbar spine, together with increase of pain on sneezing or coughing, and the paraesthesia of the outer side of the affected leg, and also the absent ankle jerk, suggest a disc lesion. The result at operation confirms the diagnosis.

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2. W.W. Age 34. Blacksmith.

This patient attended at Medical Out-patient Department D.R.I. 13/8/46, with complaint of pain in lumbar region and down the back of right leg.

History. When turning hay on 6/7/46 he felt a sudden pain in the small of the back and was unable to continue working. Thereafter he had pain on sitting or moving and slept badly. On 11/7/46 there were shooting pains down right leg worse on movement or on sneezing.

2. W.W. (contd);

He was unable to sleep or do any work on account of the pain.

About 1/9/46 the pain changed to a numb feeling and pins and needles in the sole of the right foot and back of the calf, and shooting pain occurred on movement. He was unable to lie on the right side.

Previous history. Health except for fall of Coccyx in 1943.

Examination. A healthy, well-developed man. There was no abnormality to be made out in Heart, Lungs or Abdomen. There was a tender area in the upper and outer quadrant of the right Gluteus and tenderness down the course of the right Sciatic nerve to the ankle.

There was no scoliosis but some pain on extension and flexion of the trunk was present. All reflexes were normal except the right ankle jerk, which was absent. Lasegue's sign was present on the right side and straight leg raising was limited by about 50%.

Sensation. Touch was impaired on the inner side of the right calf and outer border of the sole of the right foot.

Pain was also felt in the right lumbar region on raising the left leg. Rectal examination was negative. Urine. Negative.

X-ray Examination. "Slight upward herniation of nucleus pulposus between third and fourth lumbar vertebrae, otherwise normal."

The case was then referred to Mr. Campbell, F.R.C.S. for operation.

2.W.W. (contd);

17/9/46. Operation by Mr. Campbell in Dundee Royal Infirmary.

"Hemi-laminectomy lumbar vertebra 4. Herniated nucleus pulposus pressing on 4th lumbar nerve root. Nucleus pulposus removed."

20/9/46. Numbness of dorsum of right foot. There is no sciatic pain.

30/9/46. Ankle jerks Right present, Left, increased. Slight numbness persists in outer side of calf and foot.

10/10/46. Power of leg good, patient feels well. Still some tenderness along course of right sciatic nerve. No pain is felt at all.

Pathologists report. "Nucleus pulposus."

Comment. A definite history of sudden strain, severe pain in Sciatic nerve and small of back, with absent ankle jerk and pain increased by coughing or sneezing, suggested disc lesion. The X-ray findings were also positive in this case and the paraesthesia of the foot and the severity of the pain made diagnosis of disc probable.

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3. A.M. Gardener. Age 43.

Complaint. Left Sciatic pain, one year's duration.

Pain starts in left gluteal muscle and extends down the leg. He has had a slight scoliosis for many years. Infra-red and massage treatment had been tried without success. 10ccs. Novocaine was injected into left upper quanrant of the gluteus, but relief had lasted three days only.

3. A.M. (contd);

On examination 26/8/46:

Lumbar scoliosis to right. There is tenderness down sciatic nerve distribution. There is limitation of rotation of lumbar spine.

Wasting is present in the muscles of left buttock, thigh and leg.

Reflexes are normal, ankle jerk being present on the affected leg.

Sensation. Lateral side of left calf is hyperaesthetic to pin prink. There is no marked motor loss.

Hip joint, knee and ankle joint movements are normal and free.

Straight leg raising. Lasegue's sign is positive.

Other systems. No abnormality in Heart, Lungs, Abdomen or Urine.

Rectal examination. Negative.

X-ray Report. "Lumbo-sacral spine. There is no marked scoliosis with the convexity to the left. There is narrowing of joint space between lumbar vertebrae 4 and 5. THis is not, however, diagnostic of prolapsed disc."

31/8/46. Operation Mr. Campbell F.R.C.S. Dundee Royal Infirmary:

Partial laminectomy Lumbar vertebra 4th.

Prolapsed disc between Lumber vertebrae 4th and 5th, pushing the nerve root forward. The prolapsed disc was easily removed.

6/9/46. Apart from some pain in the left calf patient is well.

3 A.M. (contd).

29/9/46. No pain in the Sciatic Nerve. Slight pain in left calf. Scoliosis is still present.

10/10/46. No sciatic pain or numbness. Walks well.

Comment. The occupation of gardener with scoliosis, tends to cause sciatic symptoms. In this case the ankle jerk is present yet operation shows that prolapse of disc is the cause of symptoms.

X-ray findings were suggestive of disc, though the radiologist thought not conclusive.

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4. P.T. Age 43. Labourer. 3/9/46.

Attended out-patient department with a history of sciatic pain since March 1940. He stated that he had been stooping under a barrier when he experienced a severe pain in the lumbar region. He was treated by massage at Dundee Orthopaedic and Rheumatic Clinic and also had his teeth removed, but the pain persisted.

He was examined at Out-patient department 3/9/46 and a tender area was found in the upper and outer quadrant of his right gluteal muscles.

Movements of spine and all joints of both lower limbs were free and normal, except that straight leg raising of his right leg was limited to about 45 degrees. There was some loss of tone and wasting of the muscles of the right thigh and leg but power seemed about normal.

All reflexes were normal and there were no abnormalities of sensation.

Rectal examination was negative. There was no abnormality in the Heart, Lungs or Abdomen.

X-ray examination was as follows:

"There is slight scoliosis of lumber spine, but apart from that, no abnormality is seen. Lumber vertebra 5th appears unduly prominent at the lumbo-sacral junction and a lateral view would be advisable" -- "Lateral view is negative."

Urine. Contained neither Albumen nor Sugar.

On 5/9/46. 10 ccs of 2% Novocaine was injected into the upper and outer quadrant of the right gluteal region and extension of the thigh on the trunk was increased to 75% of normal. He reported again on 10/9/46 and stated that he had no pain in the leg now. Extension was still reduced to about 75% but he could walk without pain. It was thought advisable to start massage to the painful area, and this was carried out until 24/9/46, when the patient complained that the massage seemed to be causing more pain. Accordingly massage was stopped and 10ccs of 2% Novocaine was again injected with satisfactory result,

Patient reported 15/10/46 and there was very little pain, but a further injection of 5ccs Novocaine was injected.

5/11/46. No pain complained of, walking well. no pain at night. Extension of leg to 90%.

3/12/46. Improvement maintained. No complaint.

4. P.T. (contd).

Comment. The history indicated the possibility of disc injury, but the ankle jerks were present and although there was some wasting of muscles, it was not very marked. X-ray findings suggested some spinal change but was not suggestive of disc lesion.

There was a definite painful area to pressure in the Right Gluteal muscles, with favourable response to Novocaine injection.

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5. J.B. Age 46. Weaver, Dundee.

This patient was sent to the Out-patient department by her doctor on 3/9/46, complaining of pain in her right lumbar and gluteal region of over two month's duration. The pain extended down the right leg to the middle of her calf. She had had massage at home without benefit.

Bowels were regular, but she had not menstruated for about a year. There was no abnormality of Heart, Lungs or Abdomen. Urine was normal.

There was a history of several mild attacks of lumbago in the winter recently.

On examination. A tender area in the right gluteal region, upper and outer quadrant, was found and injected with 10ccs of 2% Novocaine.

Before injection Lasegue's sign was positive and

5. J.B. (contd).

extension of thigh was limited to 45%. After injection extension was to 90% and pain was absent. During injection pain was experienced running down the Sciatic distribution to the right calf. Both ankle jerks were active.

X-ray Examination. "No bony changes seen in lumbar spine. There is apparently forward tilting of the pelvis due to increased lumbo-sacral curve. There is slight asymetry of the two Ilei, the right being more prominent at the upper margin of the acetabulum. This does not seem pathological."

Patient reported on 12/9/46 and showed much improvement, movements being much more free and the pain was practically gone.

Unfortunately she did not return but it is likely that she would have done so had the pain recurred.

Comment. This appears to be a case of fibrositic Sciatica. Spinal ligamentous strain. The patient was a weaver and the constant standing at work predisposed to chronic strain of the muscle ligaments of the back and hips, especially when most of these workers tend to wear heel-less shoes at work.

There was a definite painful area in the upper and outer quadrant of the right gluteal muscle which responded very well to injection of 2% Novocaine solution. The injection of the the Novocaine was accompanied by definite pain radiating down the Sciatic nerve

6. J.D.S. Age 60. Printer, Dundee.

This man was seen at his own house on 10/9/46 suffering from Acute Lumbago with pain down the right Sciatic nerve. He was unable to move for the pain which was extremely severe. The duration of the pain was one day, and the onset was sudden. Previous history of Duodenal Ulcer, apart from which he had had no illnesses of importance in his life.

On examination, there were several painful nodules inthe muscles of the right lumbar region and in the upper right gluteal region.

These area were injected with 2% Novocaine, 10ccs, and in a few minutes the patient was able to rise from his bed and walk about.

12/9/46. Patient was able to resume work and was free from pain except on extreme flexion of trunk with knees straight.

12/12/46. Patient reported at surgery and had no complaint. He stated that he had had no further trouble after the injection.

Comment. An early case of fibrositic type, showing good result with Novocaine injection. This is the type which would be expected to give the best results to this treatment. The spasm being overcome early, muscular and fibrositic changes do not settle down and the normal range of muscular movement is soon regained.

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7. Mrs. B. Age 60. Housewife.

Complaint. Left sciatic pain of three weeks duration. Pain

7. Mrs. B (contd).

worse at night and on movement.

Previous history. Three grown-up children. Husband alive and well. A history of gallstones seven years previously. No other illness.

Present illness. Patient states that she had a chill, three weeks previously, and that the pain came on gradually and became worse so that stooping was impossible and she could not sleep for the pain

3/10/46. Patient seen at her own house where she was confined to bed.

On examination. Rather a flabby, pale type of woman. There was no abnormality found in Heart, Lungs or Abdomen. The abdominal reflexes were absent but all other reflexes were present and normal.

In the upper and outer quadrant of the left Gluteal region there was a painful area of "fibrositis", about one inch below the crest of the Ilium. Joint movements of hip and knee and ankle were free from pain and mobile. Extension of the left leg (straight) upon the trunk was limited to 30 degrees when pain was caused.

This area of "fibrositis" was injected with 10 ccs of 2% Novocaine and within ten minutes the leg could be raised 90 degrees, and there was no pain.

5/10/46. Extension of straight leg to 75 degrees, slight pain on deep pressure in painful gluteal area. Again injected with 2% Novocaine solution 10 ccs, with good results.

10/10/46. Still slight pain on movement and pressure on painful area in gluteas. She was again injected with Novocaine solution.

7. Mrs. B. (contd).

13/10/46. Able to walk in comfort, has good range of movement. No other treatment was given. Patient was intolerant of aspirin.
6/11/46. Patient called at the surgery. There was no complaint of pain or discomfort and she now walks well.
Comment. This was a fairly severe case of "fibrositic" Sciatic, osteoarthritis or ligamentous strain which, though requiring several injections of Novocaine, yet was improved on each occasion and was cured within a month.

The fact that the case was got early was probably a factor in the recovery.

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8. T.C. Age 35. Bus Mechanic, Dundee.

Complaint. This man came to the out-patient department of Dundee Royal Infirmary on 15/10/46 complaining of Left Sciatic pain of eight weeks duration. He stated that when washing a bus he had had a dull pain in his lumbar region, shortly after which he felt pain down his left leg and had to stop work.
Previous history. Apart from Scarlet fever as a child he had not suffered from any serious illnesses. Teeth were artificial and the pharynx was healthy. Urine contained neither albumen nor sugar. Rectal examination was negative. There was no abnormality of Heart, Lungs or Abdomen. C.N.S. Pupils

reacted to light and accommodation and all other reflexes were normal. The ankle jerks were present and equal.

X-ray Examination. "Slight loss of lumbar curve, no sign of vertebral collapse. There is apparently supra-pulsion of nucleus pulposus of disc between L.V. 5 and S.1."

Examination. There is a painful area in the upper and outer quadrant of the left gluteus muscles. Trunk movements are normal. Straight leg raising is limited to 70 degrees. All other joint movements are normal. 10 ccs. Novocaine were injected into the area in the left upper and outer quadrant and within a few minutes the pain had gone and leg raising was improved to a right angle.

22/10/46. Patient reported at M.O.P. department. He says that he is very much better and walks very well and with very little pain.

29/10/46. Much improved, but there was still some tenderness on deep pressure in the Gluteal upper and outer quadrant.

He was again injected with 2% Novocaine.

As the fibrositic area was still tender on deep pressure it was decided to send him to the massage department, for massage to that area only. After treatment there he reported again at M.O.P. department on 10/12/46 feeling very well and had no complaint of pain.

There was now no tenderness on deep pressure. Treatment was accordingly stopped.

Comment. If the X-ray findings were correct this seems to be a disc case which benefited by conservative treatment. The

8. T.C. (contd).

ankle jerks were both present and trunk movements were free from pain. More resistant to injection treatment than usual, but treatment was completed successfully by infra-red and massage. Probable disc.

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9. A. McD. Age 42. Dispatch Clerk.

Complaint. Called at my surgery 1/11/46 complaining of left Sciatic pain of six weeks duration.

Previous History. Duodenal Ulcer and Nasal Catarrh.

On examination. There was no abnormality of Heart, Lungs, or C.N.S. The abdomen showed a right paramediam incision (Duodenal Ulcer) soundly healed and not tender.

Extension of left leg was limited to 45 degrees by pain. Joint movements of trunk and legs were free, except that there was some pain on rotation of the trunk to the right.

A painful area was found in the upper and outer quadrant of the left Gluteus. This was injected with 10 ccs of 2% Novocaine. Five minutes after injection extension of the left leg was increased to 90 degrees, and the patient was able to walk without pain.

8/11/46. Patient reported as instructed. There was slight pain on extension of the left leg to 60 degrees, but otherwise there was no complaint.

30/11/46. Feels fine, no complaint of pain since last injection.

9. A. McD. (contd).

22/12/46. Patient is very pleased with his condition. No pain at any time, and all movements are free and painless. Extension is full. This man's general condition improved greatly after his injection, no doubt owing to his freedom from pain, and improved sleep.

Comment. This case showed a speedy and successful response to treatment of the painful trigger area of the left Gluteus with Novocaine.

No other treatment was necessary. The ankle jerks were present and the response to injection and the finding of a painful area left no doubt that this was a case of ligamentous Sciatica.

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10. R. McL. Age 28. Labourer.

Complaint. Attended at out-patient department, Dundee Royal Infirmary, 29/10/46 complaining of pain in left Sciatic distribution since March 1946. He had a history of strain of lumbar muscles due to fall down a hatch on a ship about a year previously. Apart from this his previous history was negative.

Examination. There was pain on extension of leg to 45 degrees with limitation of movement. Joint movements of leg were free though rotation of trunk was slightly limited and painful to the right. This was found to be due to a fibrositic nodule in the upper and outer quadrant of the left Gluteal area.

There was slight wasting of the thigh and muscles of the left calf, but the ankle jerks were normal. There were no abnor-:malities of the Heart, Lungs, Abdomen or C.N.S. The urine was free from albumen or sugar and there was no dysuria. The teeth were on the whole good though there were a few molars missing.

X-ray Report. "Spine and pelvis negative."

On 29/10/46 the painful nodule in the left buttock was injected with 10 ccs of 2% Novocaine with satisfactory result. Exten-:sion of thigh on trunk was to 90 degrees in a few minutes, 3/12/46. Very good result. Patient can now kick his height.. 17/12/46. Since last injection patient has been free from pain till three days ago. On account of this he has come back for another injection. 10 ccs 2% Novocaine injected. 2/1/47. No complaint since last injection. Movements good.

Comment. A case of Sciatica of seven months duration, which responded to injection of Novocaine promptly.

This case had a slight recurrence of pain which was cleared rapidly by injection of the fibrositic area.

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11. E.G. Age 26. Domestic Servant.

3/12/46. This patient came to medical out-patient department complaining of pain down the back of her left leg since June 1946. There was no history of injury and she walked fairly

well. Previous history was healthy. She was a very stout young woman weighing 12 stones 4 pounds.

Examination. The upper and outer area of her left buttock was tender on pressure, but on account of the excessive fat, it was difficult to localise the exact tender spot. Heart, Lungs, Abdomen and C.N.S. were normal. The ankle jerks were present. There was no apparent wasting of the leg or thigh. The bowels and periods were regular. The painful area was injected with 10 ccs of 2% Novocaine but owing to the excessive fat one could not be sure that the exact tender spot was injected. However, extension of the thigh on the trunk which had been limited to 60% was increased to 90 degrees.

10/12/46. Patient reported at the out-patient department. There was still considerable pain on pressure on the left buttock but extension was still 90 degrees.

X-ray finding. "Lumbar spine and pelvis are normal."

This case was thought unsuitable for further treatment by injection owing to the fat on the buttock making localisation for injection too difficult for accuracy, and she was referred to the massage department for Infra-red and massage.

Comment. It is important in fibrositic cases to inject the actual fibrositic area accurately, otherwise results are liable to be uncertain. Chronic ligamentous strain.

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12. W.F. Age 49 Housewife

29/10/46. This patient came to the medical out patient department complaining of pain in the back and down the right thigh of 10 days duration. She was a healthy woman, a 2-para, both children were alive and well. There had been no difficulty with either confinement. She had not menstruated for six months - menopause. Vaginal examination was negative. There was no abnormaility of lungs, Heart, or Abdomen. The ankle jerks were present and active. Extension of thigh on trunk was not limited in extent but was slightly painful at about 60 degrees. No definite painful spot was found but there was general tenderness on deep pressure in the right buttock.

X-ray examination of lumbar spine and pelvis was negative.

The right upper quadrant of the gluteus was injected with 40 ccs 2% Novocaine with temperary improvement only and she was referred to the massage department for further treatment.

26/11/46. Patient reported after treatment at massage department. She was very well and had no complaint.

Comment. This was a case of general fibrositis of the right gluteal muscles causing Sciatic symptoms. It was more suitable for massage treatment than for injection, and responded well to the massage.

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13. C.S. Age 61. Labourer Dundee (Single)

Complaint. Pain in the left thigh, leg and especially

in the peroneal area of the leg, of four months duration.

History. Frequent strains of the back. No serious illnesses.

Examination. There is slight wasting of the left leg and buttock. There is a painful area of apparently fibrositis in the left buttock, upper and outer quadrant. Joint movements of limbs are normal but flexion and extension of the lumbar spine is limited slightly by pain. Extension of lower limb on the trunk with knee straight is limited to about seventy degrees of normal. Heart, lungs, Abdomen are normal. Left ankle jerk is present but is diminished. C.N.S. is otherwise normal. The dorso-lumbar spine shows slight scoliosis to the right.

X-ray Examination 10/12/46. "Scoliosis of lumbar spine with secondary osteoarthritic lipping. Opaque injection is present in both buttocks".

This on investigation proves to have been antispecific treatment ten years previously. Blood Wassermann is negative.

10/12/46. 10 ccs 2% Novocaine was injected into the painful area in the left buttock. Extension of the left leg was increased to 90 degrees., and the pain was temporarily abolished.

17/12/46. Patient reported at out-patient department. There was still some pain on extension of left leg, and owing to the X-ray report of osteoarthritic changes in the spine, it was not thought a suitable case for injection treatment. He was accordingly referred to the massage department for massage and infra red ray treatment and later

postural remedial exercises.

Comment. This case is one of Sciatic pain probably due to osteoarthritic changes in the lumbar spine. The presence of the painful area in the upper and outer quadrant of the left gluteus is interesting as this represents a trigger area. Even in disc cases there may be a similar painful spot.

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14. Mrs. W.M. Age 43. Dundee Housewife.

Complaint. Pain down right leg for eight weeks, worse on walking. Patient says that the pain goes away when she lies down.

Examination 17/12/46. A well nourished woman, mother of four children. Previous history of uterine curettage eighteen months previously. Periods are now becoming irregular. Gynaecologists report is negative. Apart from this previous history is healthy. Teeth are artificial. Joints of limbs are free and painless. Rotation of trunk slightly limited and painful especially on rotation to left. Hyperextension of the trunk is also mildly painful. There is also stiffness on rising from a low chair. There is a tender area to pressure in the right lumbo-sacro-iliac triangle. There is no tender area in the glutei.

X-ray examination. "Lumbar spine and sacroiliac joints show no abnormality. There is no bony lesion to account for the symptoms."

There is no abnormality of heart, lungs, abdomen nor C.N.S. The urine is free from abnormality. Both ankle

jerks are present. Straight leg raising test of right leg is limited, to 50 degrees. 6 ccs of 2% Novocaine was injected into the painful area in the lumbo-sacro-iliac triangle and pain was abolished in a few minutes. The patient was instructed to wear her outside shoes all day, instead of wearing low heels in the house and to take pains to preserve the lumbar curves when standing and sitting.

24/12/46. Patient reported considerable improvement.

Comment. This appears to be a case showing sciatic symptoms caused by chronic sacro-lumbo-iliac strain, probably due to faulty posture and altering the height of her heels. The painful area discovered on pressure is another trigger area causing reflex sciatica. There was considerable improvement following upon injection.

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15. Mrs. M.G. Age 50. Dundee Housewife.

Complaint. Rheumatoid arthritis one years duration, left sciatic pain one month. This patient was treated in Ward 9 Dundee Royal Infirmary in September 1946 for rheumatoid arthritis of about one years duration. When in the ward she was treated with protein shock and gold. There was some improvement, but about a fortnight after discharge, she developed pain in the distribution of her left sciatic nerve.

7/11/46. Patient reported at medical out patient department complaining of left sciatica.

On examination the patient showed signs of early rheumatoid arthritis with slight swelling of the middle joints of her

ring fingers, especially the right. There was also some periarticular fibrositis of both knees. There was a tender area to pressure in the upper and outer quadrant of the left gluteus muscles. There was no abnormality of heart, lungs, abdomen, or C.N.S. and no albumen or sugar in the urine. The periods had been absent for about a year.

X-ray examination of lumbar spine and pelvis was normal.

The painful area in the left gluteus was injected with 10 ccs of 2% Novocaine solution and on 19/11/46 she reported again. There was considerable improvement as regards the sciatic pain, but her rheumatoid arthritis appeared to be much the same.

28/11/46. No complaint of sciatic pain.

6/2/47. Patient reported with recurrence of left sciatic pain and was again injected with 10ccs of Novocaine solution. The pain was relieved.

20/2/47. Slight stiffness of back but no complaint of sciatic pain.

Comment. This case shows sciatic pain due to associated fibrositis in the course of rheumatoid arthritis. The fibrositic sciatica responded well to the injection treatment. The arthritis is at present being treated with gold with only moderate success.

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16. D.Y. Age 34 yrs. Labourer.

This patient was admitted to Ward 8 of Dundee Royal Infirmary on 16/11/47, complaining of very severe left

sciatic pain since November 1946. There was a history of a fall on the sacrum in 1936. He had been a prisoner of war for two years during the war.

Complaint. Feels the pain in his leg all the time and cannot sleep. The patient lies huddled up on his left side and cannot lie on his back. Apart from this attack the past history is negative.

Examination. There is no abnormality of heart, lungs, or abdomen. Owing to his pain it was not possible to try the straight leg raising test but joints were free except the lumbar spine which was held rigid. The left ankle jerk was absent. Rectal examination was negative.

X-ray examination. was also "Negative". B.P.135/88 h.b. 103%

There was no urinary abnormality. Lumbar puncture showed 2 cells per cmm. and Queckenstedt test was normal. Wassermann was negative.

Treatment. He was given powders consisting of Aspirin, Phenacetin, and Caffeine Cit. every three hours with moderate result, but as the pain persisted, an attempt was made to inject the painful upper and outer quadrant of his left gluteus. Owing to the fact that he could not move for the pain this was unsatisfactory and the actual painful spot could not be injected.

On 17/1/47 the L.O.Q. was injected with 10ccs 2% Novocaine solution and there was about six hours complete freedom from pain. The pain recurred however and on 18/1/47 the same area was again injected this time with more lasting effect. A firm cushion was fitted into the lumbar region to increase the lumbar curve and to relieve strain and on

21/1/47 his condition was much better the patient now lying comfortably on his back, able to move better and sleep was satisfactory.

30/1/47. As the patient had domestic reasons for wishing to return home he was allowed up early and walked fairly well.

31/1/47. Patient returned home walking well and with very little pain or discomfort.

Comment. This case of very severe sciatica appeared to be a disc case at first, but the muscular spasm passed off quickly with analgesic drugs and after injection progress was rapid. The use of the firm pillow in the lumbar region was helpful in relieving spasm of lumbar muscles and is frequently helpful especially in postural maluse. The improvement in just over a fortnight was most satisfactory and shows the benefit of injection treatment even during the acute stage.

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17. Mr. M.R. Age 50. Unemployed labourer.

Complaint. This patient was admitted to the medical wards of Dundee Royal Infirmary, with a severe attack of Right Sciatica on 8/5/47.

History. A married man who had suffered from Bronchitis and Asthma for about twenty years. Appendix was removed in 1915. No previous rheumatism or Sciatica.

Present Illness. On 4/5/47, on rising from a chair, he developed a sudden severe pain in the right buttock, and the pain quickly spread down the back of the right thigh and leg to the ankle. He was confined to bed and unable to

walk from that time till admission to the ward. The pain was more intense in the region of the outer aspect of the right foot, and prevented him from sleeping.

Examination. Patient lies on his right side with the legs flexed.

He coughs frequently and shows signs of Bronchitis. He looks older than his stated age. Blood pressure is 110/70. and the cardiac dullness is impaired owing to emphysema. There are moist rales and expiratory rhonchi scattered throughout both lungs. Heart sonds are closed. The abdomen shows old appendix scar, soundly healed and not tender.

Central nervous system. Pupils react to light and accomodation. Arm reflexes are normal, abdominals are present, as are the knee jerks. Ankle jerks are present and equal. Plantar reflexes are flexor in type. Fundi are normal. Rectal examination is neg. Haemaglobin is 105% W.B.C.9100. Urine contains neither albumen nor sugar. The prostate is normal.

Locomotor System. Joint movements are normal at hips, knees and ankles. Rotation of spine is nearly normal except for slight guarding. Both flexion and extension of the lumbar spine is resisted and the lumbar curve is decreased. Straight leg raising on the left side is normal to at least 90 degrees, while on the right side it is limited to about 30 degrees. There is no muscular wasting and no hyperaesthesia nor paraesthsia.

Gluteal region. There is marked tenderness on deep pressure over the upper and outer quadrant of the right

gluteal region.

X-ray examination of lumbar spine and pelvis is negative.

Treatment. After examination, he was kept in bed with a firm pillow in the lumbar region in order to accentuate the lumbar curve, and to relieve strain. He was given a powder consisting of Aspirin gr. 10 Phenacetin gr. 3 and Caffein Citrate gr 2, and this proved effective in relieving pain when given at three hourly intervals. The presence of some occult blood in the stools may have been due to this as X-ray examination of the Gastro-intestinal tract showed no abnormality, nor did rectal examination.

9/5/47. 15 ccs Novocaine were injected into the tender area of the Right Gluteal region, and in about five minutes extension of the right leg was possible to 75 degrees. The patient became rather pale and felt faint, but this passed off in a few minutes. There was no recurrence of this on subsequent injections. He was a very nervous individual.

11/5/47. Patient is much better and can extend the leg to 75 degrees without pain.

16/5/47. Injection of 10ccs Novocaine repeated. Good result.

20/5/47. Hardly any pain now. He is now allowed to rise to lavatory.

27/5/47. No complaint of Sciatic pain but there is still some pressure tenderness in right gluteal region.

2/6/47. Discharged home. To report to the out patient department for massage treatment.

17/5/47. Referred from the massage department . Patient

says that he feels well and has now no complaint. There is no gluteal tenderness and straight leg raising is normal. There is some loss of tone of the muscles of the back of the right thigh and leg. Ankle jerks are normal.

Comment. A very severe Disc Sciatica which responded well to the injection of Novocaine and to relaxation of the lumbar curves. Although a severe case, the fact that treatment was early and full, resulted in rapid recovery. Massage as after treatment was helpful. The presence of occult blood in the faeces was noted, and was probably due to the large doses of Aspirin.

18. Mr. R.D. Age 39 yrs. Married-Occupation Mill Mechanic.

Attended at surgery on 9/9/47.

Complaint. Right Sciatic pain duration three weeks.

Previous History. Occasional attacks of lumbago during the last five or six years. No other illnesses of note except chronic left otitis media.

History of present illness. Patient stated that he had had several attacks of lumbago during the last five or six years, and that about a month previous to his attendance, he had felt pain in the muscles of his right buttock. About a week later he began to have pain down the back of the right thigh, and sometimes as far as the calf.

Examination. General examination showed no abnormality except chronic right otitis media and catarrhal condition of the nasopharynx. Movements of trunk were free and

painless. All joints, including hip joints were free from abnormality. C.N.S. reflexes were normal and ankle jerks were present and equal. There was no disturbance of bladder or bowel.

Muscles. On pressure there was a tender area in the upper and outer quadrant of the right gluteus. There were no other tender areas.

Straight Leg Raising. On the right side this was limited to 45 degress. There was no muscular wasting.

X-ray examination was not carried out in this case.

The same day, 9/9/47, the painful area in the right gluteus was injected with 10 ccs of 2% Novocaine without Adrenalin. In ten minutes,,straight leg raising was equal in both legs to 90 degrees.

13/9/47. Patient reported that he was well and working.

On examination. There was now no tenderness in the outer and upper quadrant of the right gluteus.

26/9/47. No return of symptoms.

Comment. A mild case of Sciatica, treated early. Previous history of lumbar fibrositis later spreading to the trigger areas in the gluteal muscles. Successfully treated by the injection of Novocaine.

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19. Ann D. Age 17. Scholar only child.

Came to out-patient department of Dundee Royal Infirmary 10/6/47.

Complaint. Right sciatic pain since appendix operation August 1946, pain being worse on walking.

Previous history. Appendix operation Dundee Royal Infirmary, August, 1946. No other illnesses except measles in childhood.

Examination. A well nourished rather slim girl. Bowels are regular as also are her menstrual periods. Teeth are exceptionally good, and the throat is healthy. h.b.90% There is no dysuria. There is no abnormality of Heart or Lungs. Abdomen is normal except for appendix scar in right Iliac fossa, soundly healed.

Central Nervous System. Normal. Ankle jerks equal and present.

Trunk and joint movements. These are free except for slight limitation of rotation of trunk to the left.

Straight leg raising. Limited on right side to about 60 degrees.

Sciatic Nerve tenderness. None.

Muscular wasting. There is no wasting except in the right buttock, where there is loss of tone.

Painful area. There is a painful spot on deep pressure in the upper and outer quadrant of the right gluteus.

X-ray examination. 10/6/47 "Lumbar spine and pelvis, negative ".

10/6/47. Painful area in right gluteus injected with 10 c.cs 2% Novocaine.

19/6/47. Reported at out patient department. Very much improved. Extension of leg, normal. Still small area of fibrositis in right gluteus. Again injected with 10 ccs 2% Novocaine.

19/6/47. Much better, can kick her height and touch toes

without pain. No tenderness now in right upper quadrant of gluteus. Sent to massage department for Infra red and massage, to help tone of buttock and condition generally.

20/7/47. Reporting from massage department. No complaint. There is still some loss of tone in right buttock. Discharged.

Comment. Possibly there may have been a septic focus in the appendix, and subsequent loss of tone after the operation. There was a very satisfactory response to Novocaine. The loss of tone in the buttock persisted after pain had gone. This is common, and is probably due to "guarding".

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20. J.P. Age 56 years. Married. Clerk.

This patient was referred to Medical out-patient department with a history of Sciatic pain of four weeks duration, following upon lumbago eight weeks previously, which he said had been brought on by a "cold".

Previous History. Healthy, no previous illnesses of note. Married with one child..

Examination. A fairly well built man, looking younger than his age. Teeth are deficient, but partial denture is worn. Teetotaller and non smoker. There is no abnormality in heart, lungs or abdomen. Legs show slight bowing from old rickets. There is marked wasting of left gluteus, thigh and calf. Left knee jerk was more brisk than the right. There was paraesthesia of the dorsum of the left foot, but no changes could be made out to pain,

touch or temperature.

Trunk movements. There was slight limitation of rotation to the right, but otherwise trunk movements were normal.

Leg raising. Left leg was limited to about 70 degrees, the right to about 90 degrees.

Ankle jerks. Both ankle jerks were present and normal.

Urine. No abnormality. Rectal Examination. Negative.

On palpation. Two areas of fibrositis in the left upper and outer quadrant of the left gluteus, and also tenderness on pressure in the left sacro-Iliac-lumbar triangle low down.

X-Ray report. "Lumbar vertebra 5th is set low in the Pelvis, and the pelvis shows slight rachitic deformity. There is loss of lumbar curve but otherwise, no lesion ".

Injection. The fibrositic area in the left upper and outer quadrant of the left gluteus was injected with 10c.c.s. 2% Novocaine, and the left Sacro-Iliac-Lumbar triangle, with 8c.c.s of the same solution.

6/5/47. Patient reported at the out-patient department, and was found to be much better, though there was still some deep tenderness in the tender areas previously noted. Injection was again performed with 20 ccs. Novocaine in all, and manipulation of pelvis was carried out by rotation and hyperextension, without anaesthetic. As there was a slight scoliosis, with concavity to the right, the left boot was raised by half an inch.

13/5/47. Patient reported, greatly improved. Could touch toes, and kick his height. He was sleeping well.

3/6/47. No complaint-discharged.

Comment. Rickets with faulty posture and clerical employment contribute to cause chronic strain and fibrositis. Response to novocaine was good. Paraesthesia of the foot and pain in the Sacro-lumbo-Iliac triangle was a feature. The ankle jerks were normal. Correction of the scoliosis by boot raising, I think, helped the early recovery.

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21. A.S. Age 25 years. Railway Shunter (unmarried) Attended medical out-patient department. 5/9/47.

Complaint. Pain in left gluteus and outer side of the thigh of three weeks duration, made worse by movement and at night.

Previous History. There was no history of injury, but occasional lumbago during the last year. Non smoker and teetotal. There were no previous illnesses, except Measles as a child. Teethwere good and the throat normal. There had been no dysuria.

Examination. There was no abnormality in heart, lungs or abdomen. Trunk and joint movements were normal and painless. Ankle jerks were normal and equal.

Tender area. A tender area was found on deep palpation in the upper and outer quadrant of the left gluteus.

X-ray examination.

Report "No abnormality ".

Injection. Painful spot in left gluteus was injected with 10ccs 2% Novocaine solution.

16/9/47. Patient reported well and examination showed no tenderness in the gluteus and the patient could touch the

toes without difficulty.

Comment. This was a simple fibrositic Sciatica, with a previous history of lumbago. The early and good response to one injection, only, of Novocaine, is worthy of note.

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22. S.W. 42 years old. Cable jointer (Widower)

Attended out patient department, 27/5/47.

Complaint. Pain in the back and down the back of right thigh, two weeks duration.

Previous history. Occasional lumbago during the last six years. Doctor's note states that the patient has just recovered from a severe attack of lumbago, and that Sciatic symptoms have been present for about one week. Patient has two children, alive and well. His wife died five years previously of Pulmonary Tuberculosis. He has had no previous illness of note.

Present condition. There is no abnormality in Heart, Lungs, or Abdomen. There has been no dysuria. Ankle jerks are present and equal, Knee jerks are normal, and there are no paraesthesias nor sensory loss.

Trunk movements and Straight leg raising. Flexion of trunk is limited by guarding. Both legs on raising are limited to about 70 degrees by pain in the back.

Painful areas. On examination a painful area to the right of the third Lumbar vertebra is found on deep pressure. There is no deep tenderness in the buttocks.

X-ray report. "Dorso-lumbar spine and pelvis, There is localised osteophytic lipping of L.V.3 and 4, otherwise

no bony abnormality. A large mass of calcified glance are present in the left side of the abdomen ".

Injection. The painful area to the right of 3rd Lumbar vertebra was injetted with 5 ccs of 2% Novocaine.

3/6/47. Patient reported at out-patient department. No complaint.

Comment. The Sciatic symptoms supervening on lumbago, with tender area in right lower lumbar region, without gluteal tenderness, was unusual, But as the case was of short duration and response to injedtion was so rapid and satisfactory, it is possible that the pain was reflex, and that if it had persisted, the typical tender area in the gluteal muscles would have been found.

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23. Mrs. M.N. Age 53 yrs. Housewife (Widow.)

Complaints. This case was seen privately. She had been nursing her husband for four months, and on his death, a month before her illness began, she had gone on holiday. There had been a good deal of heavy lifting during her husband's illness. During the first part of her holiday, she had a mild attack of lumbago, but she kept going about and took aspirin. Three weeks before the attendance began, she developed very severe left Sciatica, and called in the local doctor who prescribed powders with a small dose of aspirin and morphine. She did not lie up, but eventually the pain was so severe that she returned home. She was seen by me on 6/9/47. On that date she lay in bed and could not move without crying out.

Pain was very severe in the left buttock and left leg and she was very agitated and tearful. She was removed to a nursing home.

Previous history. Very healthy, there had been no previous illnesses. She was rather stout. Bowels were regular but her menstruation had ceased two years previous-:ly.

Examination. Trunk movements were resisted owing to pain and the examination was difficult owing to fear and pain. Heart, Lungs, Abdomen were all negative. Ankle jerks were present, but the left was dimished.

Tender areas. A very tender area was found in the upper and outer quadrant of the left gluteus.

Straight leg raising. This was much limited to about 30 degrees.

Treatment. As she was in so much pain, 10ccs of 2% Novotox was injected into the painful area. She was visited in the nursing home a few hours later, where she was found to be free of pain, and naturally very pleased and delighted. She was able to move freely in bed. Tab. Empirin Co.c. Codein. two tablets every three hours were prescribed and when seen next day she was still free from pain. She was allowed up on 19/9/47 for a short time. The tablets were reduced to four hourly. On 22/9/47 there was a storm of wind and rain, and the following day there was a return of pain. In addition to the pain in the upper and outer quadrant of the left gluteus, there was tenderness in the left sacro-iliac-lumbar triangle, and this was injected with 10ccs of 2%

Novotox. Pain was completely abolished and there has been no return of the severe pain. She returned home on 27/9/47. There was no X-ray facility in the home so she was not X-rayed. Since returning home, there has been some slight stiffness occasionally after walking. She has had massage treatment, limited to the painful areas only, and has made good progress.

31/10/47. Patient is well and goes out daily for her messages.

Comment. It is possible that there may have been disc injury due to lifting her husband, but there was no history of sudden pain. The attack began with a lumbago. The left ankle jerk was diminished. This was a very acute case with an emotional element, It is sometimes stated that Novocaine injections should be used in the acute stage of Sciatica. In this case, the injection was most effective. There is now no tenderness, and the patient walks well. She was much impressed with the rapid change from pain to comfort. The return of the pain following climatic change is noteworthy. Many Sciatic patients state that they are worse in windy weather. The response to the injection of Novotox was equally dramatic in the second occasion when the pain returned.

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24. John W. Age 32. Jute loom mechanic (Married.)

Complaint. Came to surgery, 4/10/47, complaining of right Sciatic pain which came on suddenly four days previously, when lifting a ladder. The pain first

affedted the bottom of his spine and was followed two days later by pain in the right leg.

Previous history. A healthy active man with no previous illnesses of note.

Present condition. Teeth are artificial on top, lowers are good. He is a Teetotaller and a moderate smoker. There is no abnormality in Heart, Lungs or Abdomen, Knee jerks are normal and the ankle jerk are present and equal.

Examination. A painful area on deep pressure is present in the upper and outer quadrant of the right gluteus. Trunk movements are free as regards rotation and extension. but forward bending is limited by pain.

Straight leg raising. This is limited to about 70 degrees. Lassegue's sign is positive.

Treatment. The painful area was injected with 5 ccs of 2% Novotox, and shortly extension was increased in the leg to 90% degrees.

6/10/47. Patient reported. His condition was much more comfortable, but on trying to touch the toes he experienced a severe pain in the lumbar spine and flexion was again limited. He was again injected with Novotox.

X-ray examination. 7/10/47. "Lumbar spine shows Schmorl's nodes invading adjacent surfaces of the bodies of 1-2, and 3rd lumbar vertebrae, otherwise normal. There is a congenital deformity of the lower coccygeal segment, Otherwise the pelvis is normal ".

9/10/47. Patient is very much better and has returned to work.

Comment. The X-ray in this case shows early osteoarthritic changes in Lumbar vertebrae 1,2 and 3, but too high to produce typical Sciatic signs. As is frequent in those cases there is a tendency to ligimentary strain and fibrous tissue changes, under stress. Although the onset was sudden, the presence of the ankle jerks and the absence of paraesthesias together with the X ray picture, make it unlikely that this was a disc case. The reponse to injection of Novotox and the early return to work on that account are satisfactory features in the case.

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25. Mrs. W.B. Age 35 yrs. Housewife (Married)

History. This patient came to medical out-patient department of Dundee Royal Infirmary on 16/9/47, sent up with a diagnosis of ? spondylitis and arthritis of left knee. Patient has had fibrositis of her lumbar muscles following upon an operation for appendicitis in November 1946. This was followed in a few weeks by pain in the left knee and down leg and thigh, (Sciatic distribution). She was treated at Dundee Rheumatic Clinic by massage and heat, by which the back was improved but not the leg.

Previous health. She had had one child three years previously. Pyelitis five years before attendance and a year later an "hysterical attack". Her appendix was removed eleven months before attendance at the out-patient department.

Examination. Healthy appearance, teeth artificial, throat was normal. The bowels and periods were regular

and normal. There was no abnormality in heart, lungs nor central nervous system. Abdomen showed appendix scar, soundly healed and not tender.

Special examination. All joints free and painless. Nothing abnormal could be made out in the left knee. Trunk movements were free in all directions. Straight leg raising was limited to about 60 degrees.

Painful area. On deep pressure, a painful nodule was made out in the left upper quadrant of the left gluteus. Ankle jerks were normal, and there were no paraesthesias or sensory disturbances.

X-ray examination. "Lumbar spine and pelvis negative. Hip joints and both knee joints, no abnormality."

18/9/47. Upper and outer quadrant of the left gluteus was injected with 6 ccs of 2% Novocaine, The pain in the knee and affected leg disappeared in about ten minutes.

22/9/47. Patient reported. No complaint.

7/10/47. No complaint, pain gone and patient had resumed her housework.

Comment. The lumbar pain was improved with massage at the Rheumatic Clinic. The diagnosis of arthritis of the left knee was obviously not correct. The pain was of sciatic distribution, and the knee and hip movements were free and painless. There was no swelling of the knee. The painful area in the left gluteus was easily found, and when injected, the patient's symptoms rapidly disappeared and after three weeks she remained free from pain.

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26. Miss M.G. Age 44. Domestic Servant.

Complaint. Pain in left leg, (not severe) Sciatic distribution, three months duration. Patient states that the pain is worst when lying in bed and improves when going about. There is a tired feeling in the leg with tingling and a numb feeling, She has noticed that her left leg is thinner than her right and is rather flabby.

Previous history. "Sore back" for several years and Nephropexy in1924, apart from this she has had no illnesses of note.

Present condition. Rather a tired looking woman and she limps slightly. There is no abnormality in heart, lungs or abdomen.

Central nervous system. Left ankle jerk is diminished. Sensation to touch and temperature and pain are normal, but vibration sense is diminished on lower and outer aspect of left leg. The leg feels slightly colder than the right, and there is 1 inch wasting in the left calf. The tone of the left buttock is diminished. There is an area of deep tenderness in the upper and outer quadrant of the left buttock, but this is not marked.

Straight leg raising. is limited to about 70 degrees.

Trunk movements appear normal.

X-ray report. "Bones of lumbar spine and pelvis appear normal except that there is Sacralisation of the left lower margin of 5th lumbar vertebra, which is fused with the lateral element of the 1st Sacral ".

Treatment. In view of the X-ray report and that the pain

was not severe, and also that accurate localisation of a painful area was difficult, no injection of Novocaine was given. Patient was referred to the Medical Electric Department for diathermy.

Discussion. This is an interesting case which shows probable involvement of Sciatic roots of Lumbar 5th and Sacral 1st. There is diminished ankle jerk on the affected side and loss of muscular tone and wasting. There was also loss of accurate vibration perception over an area corres-:ponding to 1st Sacral segment. The patient was not seriously disturbed by pain, and was quite satisfied when the cause of the wasting of the leg was explained to her. It is sometimes stated that Sacralisation does not cause symptoms, but this case shows the reverse, though the pain was not severe.

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27. Miss M.D. Age33 years. Cook. (Admitted 24/1/48)

Complaint. Sciatic pain and weakness in right leg.

History. This patient had suffered from periodic Sciatic pain since the age of 18 years. She had had low back pain and pain referred down the left leg which appeared to vary with climatic conditions. About November 1947, she had began to experience pain in the Right leg, also which was more or less continuous and there was loss of power, also in the right leg. The pain and weakness was most marked in the outer part of the leg and on the dorsum of the foot. She felt that she was going to go over on her ankle when

she walked and that she could not rise on her toes. There was occasional swelling of the right ankle. There was no history of dysuria but there was occasional stress, incontinence and enuresis.

Previous illnesses. There was no illnesses of note except a doubtful history of "Pleurisy".

Examination. A well nourished healthy looking woman. There was no abnormality in Cardio-vascular, Respiratory of Abdominal systems. There were no gynaecological abnormalities.

Central Nervous System. Pupils reacted to light and accomodation. The arm jerks were normal. Abdominal reflexes were not elicited. Both ankle jerks were absent and the Plantar reflexes were plantar flexion. There was no sensory disturbance in either leg. There was some loss of power in the right leg but no muscular wasting. Lasegue's sign was negative in both legs. Joint movements of trunk and legs were normal, hb. was 82%. There was nothing abnormal in the urine.

X-ray examination. Report on Lumbar spine and Pelvis. 29/1/48 " There is an area of decalcification present in the upper sacrum. L.V.5 is set low and appears to have depressed into the upper sacrum. False joint formation has taken place between the upper sacrum and transverse process on the right side. This area of decalcification in the sacrum is due to tumour formation, probably of plasmocytoma type. Biopsy would be interesting in this case. " W.S.

In view of this X ray report serological investigation was

carried out and was as follows:-

Total protein ..... 7.20 gm%
Albumen ..... 5.60 gm%
Globulin ..... 1.60 gm%
Serum Calcium .....11.1 mgs%
Inorganic Phosphate as P.3.7 mg%

Further X-ray examination was carried out on 12/2/48. "Skull both upper humeri and both femora show no osteolytic area to suggest plasmocytoma."

On 17/2/48 patient was transferred to surgical ward for biopsy.

Biopsy 21/2/48. Mr. Campbell F.R.C.S. Report of Biopsy. "There is no sign of plasmocytoma but there is a fairly cellular fibroma.

Treatment. Owing to the position of the tumour, no further surgical treatment was possible, and the patient was discharged on 8/3/48, her condition being unchanged.

Discussion. The very long history of left Sciatic pain later more severe in the right leg, without any muscular wasting and a negative Lasegue sign is a different picture from that ofthe usual Sciatica. The X-ray examination in this case was of great value and confirmed the impression obtained clinically. The serological tests rather tended to negative the diagnosis of a plasmocytoma especially of a malignant one. This was borne out of biopsy.

Diagnosis. Fibroma of the upper sacrum causing Sciatic Symptoms.

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28. Mrs. M.A. Age 61. Housewife.

Complaint. Right Sciatic pain of three days duration.

History. On 3/10/47 this patient was seen at her own house on account of right sciatic pain which had come on gradually three or four days previously. The pain was worse at night and extended down the back of the right thigh to about the Popliteal region.

Trunk movements were normal but extension of the lower limb on the trunk was limited to about seventy degrees. A painful area was made out in the upper and outer quadrant of the right gluteus. This area was injected with 10ccs of 2% Novocaine. Pain was considerably relieved. On the morning of 4/10/47 the patient was again visited at her home when a definite herpetic eruption was found on the right buttock and extending down the back of the right thigh to about the knee.

Diagnosis. Herpes Zoster of the right Sciatic nerve.

Discussion. Sciatic Herpes Zoster is of rare occurrence. Fletcher (1947) states that he has never seen a case. The duration of the pain after the eruption had made its appearance was very short. Whether the injection of Novocaine had anything to do with this is not clear.

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29. Mrs. J.S. Age 44 Cleaner.

Complaint. Left Sciatic pain of one months duration.

History. This patient was seen at the out-patient department of Dundee Royal Infirmary on 6/4/48, complaining of pain in the distribution of the left sciatic nerve, of one months duration. For four months previously, she had complained of low back pain which had come on gradually, and had become worse. Three months later the pain spread

to her left thigh and leg.

Previous History. Her previous health had been good, and apart from Scarlet fever as a child, she had had no serious illness. She had two children and both they and her husband were alive and well. She had worked as a cleaner up to six weeks before attending the out-patients department.

Examination. Rather a thin, but otherwise healthy looking woman. There was no abnormality to be made out in chest, heart, or abdomen. Bowels and menstrual periods were normal and there was no dysuria. Teeth were artificial.

Central Nervous System. Pupils reacted to light and to accomodation. Arm jerks were normal and equal. Abdominal reflexes were difficult to elicit, but were present. Both knee jerks were present and there was no alteration in them. Ankle jerks were present, but the left ankle jerk was diminished. There was some parasthesia of the outer side of the left foot but no sensory objective loss. There was some loss of tone and wasting of muscles of the left buttock, thigh and leg.

Locomotor System. Rotation of the trunk was free and painless, but there was slight lumbar scoliosis to the affected side and the trunk was held rather stiffly on bending forward. Hip and knee movements were normal. Straight leg raising was limited to about 80 degrees and Lasegue's sign was positive.

Painful Area. An area of deep muscular tenderness was elicited in the left upper and outer quadrant of the gluteal muscles. This area was infiltrated with 10ccs of

2% Novocaine with almost immediate relief of symptoms, and straight leg raising was increased to a right angle.

X-ray report. "Bones appear normal except for slight arthritic lipping of 3rd and 4th lumbar vertebrae."

Further progress. Patient was sent to the massage department for infra red and massage. She attended three times a week until the beginning of June 1948, and reported after treatment had been completed on 10/6/48. She had no complaint. Examination showed that the left ankle jerk was still diminished but muscular wasting was not so pronounced. She was then dishharged.

Discussion. The parasthesia of the left foot rather pointed to involvement of the nerve trunk by a disc, but the X-ray report showed arthritis of lumbar vertebrae.

Diagnosis. Sciatica with arthritic changes in spine

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30. , Mrs, Jessie B. Age 68. Housewife (married).

Complaint. Acute right Sciatic pain of five days duration.

History. This patient was attending the eye department of Dundee Royal Infirmary on account of diabetic retinitis. On 26/8/48, she began to have pain in the right gluteal region, and on the 27/8/48 after sitting for some time in the eye dept. she began to have pain spreading down the back of the right thigh. The pain increased in intensity and she had to take to bed, where she remained until 31/8/48, when her doctor sent her into the medical wards of the Infirmary.

Previous History. She had suffered from diabetes for some

years and had attended the eye department for diabetic retinitis in 1947. She had had nine children, six of whom were alive and well. Apart from the diabetes, she had not been ill since a child.

Examination A fairly well nourished elderly woman, lying on her left side with both knees flexed. She complained bitterly of pain down the back of the right thigh and leg. There was tenderness in the region of the sciatic notch and down the course of the nerve to the ankle. Blood pressure was 165/75. There was no abnormality in the heart, lungs, or abdomen. Rectal examination was negative.

Central Nervous System. Pupils were equal and reacted slowly to light. There was well marked diabetic retinitis with exudate. Arm tendon reflexes were normal. Abdominal reflexes were absent. Knee jerks and ankle jerks were both absent. Plantars were normal.

Blood. H.b. was 90%. Urine. Sp.Gr.1025 Albumen and sugar ---- present.

Blood sugar. 0.273 on 2/9/48.

Locomotor System. Left leg, there was an old arthritis of the left knee with flexion limited to 90 degrees, the result of an old accident. Hip movements were normal and trunk movements were free. Right leg, Lasegues sign positive at about 50 degrees and movement was much resented.

X-ray examination. 6/9/48 "Advanced osteoarthritis of left knee. Hip joints and lumbar spine, negative ".

Progress. The case was thought to be one of diabetic

neuritis of the sciatic nerve, and she was put on a reduced carbohydrate diet. Improvement was rapid, and on 3/9/48 she was much more comfortable. Blood sugar on that date was o.273% but sugar had disappeared from the urine. On 11/9/48 blood sugar had fallen to 0.228% and there was very little pain in the leg.

On 13/9/48 she was free from pain and was allowed out of bed.

She was discharged from hospital well on 14/9/48.

Discussion. This case of diabetic neuritis of the sciatic nerve improved surprisingly rapidly on a reduced carbohydrate diet. There was no other treatment beyond rest in bed, with, at first one dose of nepenthe, and later aspirin to control the pain. The high blood sugar with disappearance of sugar from the urine showed a high renal threshold.

Diagnosis. Sciatica due to diabetic neuritis.

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31. Thos. L. Age 38. Infirmary Porter. (Married).

Complaint. Right sciatic pain.

History. This man, a porter in Dundee Royal Infirmary, was referred to the out-patient department on 17/6/48, complaining of severe pain in the region of his right sciatic nerve. He stated that seven weeks previously, when lifting a patient, he experienced a sudden severe pain in the lower part of his back. He was unable to straighten up, and in a few minutes he began to feel pain shooting down the back of his right leg. The pain spread down to the outer side and dorsum of his right foot and he

began to feel tingling and numb feelings in that area.

Previous History. Health had always been very good except for an attack of lumbago three years previously.

Examination. Patient was a healthy athletic type of man. Teeth were artificial. Smokes ten cigarettes per diem. There was no abnormality in heart, lungs, or abdomen.

Central nervous System. Pupils reacted to light and accomodation. Arm jerks and abdominal reflexes were present and normal. Knee and ankle reflexes were both present. Plantars were flexor. He complained of pain in both legs, but mostly in the right. He also complained of parasthesia in the outer side of the lower third of the right leg and outer side of the right foot, but no diminution nor hyperaesthesia could be made out. The back was held very stiffly and the lumbar curve was absent. Rotation of the trunk was normal, but extension was resisted. Lasegue's sign was positive on the right side at 40 degrees. Lasegue's sign was negative on the left side. There was no muscular wasting, but slight scoliosis to the left.

X-ray examination. Report No. 8909 "There is a tendency to bulging of the discs into L.3, 4 and 5, otherwise the intervertebral spaces appear normal. All bones show a tendency to decalcification ".

Urine. No albumen nor sugar.

Tender areas. The sciatic nerve was not tender to pressure. There were tender areas in the upper and outer quadrant of the right gluteal region and to the right of Lumbar vertebrae 4 and 5.

22/6/48. The area to the right of the lumbar spine was injected with 10ccs of 2% Procaine as was also the area in the right buttock. In a few minutes the extension of the right leg was performed painlessly to a right angle. On injection of the right buttock, the pain was felt down the sciatic nerve to the ankle.

24/6/48. Patient reported and stated that he felt much better.

29/6/48. As there was still some pain on extension of the right leg, 40 ccs of ½% Procaine was injected deep into the right Lumbo-sacro-iliac triangle.

1/7/48. Patient reported again at the out-patient department. He was very well and could touch his toes without difficulty. He was anxious to resume his work, and as there was now no pain, he was allowed to do so. He has been seen at intervals since when at his work, and has had no recurrence of the pain. He is doing full work.

Discussion. The sudden onset, the rigidity of the Lumbar spine with scoliosis and the positive Lasegue sign together with the previous history of "lumbago" point to this being a definite disc case. There was tenderness to the right of the lumbar spine at L.4 and 5 and there was a painful area in the right buttock, spastic muscle due to referred pain. The response to Procaine injection was very satisfactory and the large injection of 40 ccs into the lumbo-sacro-iliac triangle was particularly so. The duration of the illness was cut short.

Diagnosis. A case of disc sciatica treated medically.

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32. George G. Age 45. Cinema Manager.

Complaint 14/9/48 Pain in the peroneal region of right leg - 6 months duration.

History. This patient came to the out-patient department of D.R.I. with a complaint of pain in the outer side of the lower part of his right leg which had come on gradually in the last six months. His previous history was negative except that he had had for many years a postural deformity of the dorso-lumbar spine, probably rachitic. There was no history of injury.

Examination. Rather a thin individual with a marked kypho scoliosis of dorso-lumbar region with tilting of the pelvis to the side of the pain. The right leg seemed to be shorter than the left for that reason, but measurement showed that this was due to the tilting. There was no abnormality in heart, lungs, abdomen or central nervous system. The ankle jerks were present and normal. Patient complained of parasthesias in the right peroneal region but no objective sensory disturbance could be made out. Rotation of trunk was performed easily and without much discomfort. Forward bending was slightly restricted and patient could not touch the toes (never could) he says. There was some loss of muscular tone in the affected area of the right leg. The urine did not contain anything abnormal and there was no dysuria or frequency of micturition.

X-ray examination. "There is a fairly marked scoliosis

with wedge deformity of the bodies of the dorso-lumbar vertebrae with lipping of right lateral margins of the lower dorsal vertebrae ".

Report of Orthopaedic sugeon. "This patient's pain on the lateral aspect of the leg has, as you say, its origin in the lumbar spine and it is probably due to root pressure either from the disc itself or bony region. There is, however, a mechanical problem because of the shortening of the right leg and because of the callosities on the tarsus of the left side, he is taking more weight on the right side than he would normally do. I think that the correct thing to do here is to make shoe alterations on the left side to take pressure of the callosities, raise his shoe all over on the right to correct the shortening, and put him on back exercises ".

29/10/48. Patient was referred to the Rheumatic and Orthopaedic clinic and the above recommendations were carried out.

Patient was seen at the rheumatic clinic. He was very much improved, the pain was gone and there were only occasionally parasthesiae of the lower right leg. His general health also seemed to have improved.

Discussion. A case of postural deformity with Sacral 1, root sciatica, probably due to involvement of fifth disc. Considerable and early improvement due to correction of deformity by orthopaedic means and by back exercises.

Complaint. Left Sciatic pain.

History. About the beginning of April 1946, when he was at work patient experienced a sudden and severe pain in the lumbar region. After a few days the pain spread to the back of the left leg, and he was laid up for about three weeks. On 6/9/48, when stooping he was again seized with pain in the left hip and left leg, the pain was very severe especially at night and on walking. He came to the out-patient department on 28/9/48. Previous health apart from the present illness had been very good, and he could not remember being ill before except for Measles as a child.

Examination. There was no abnormality in heart, lungs, or abdomen. Urine contained neither albumen nor sugar and there were no disturbances of urinary fuction. The lumbar region was held stiffly and forward bending was much limited, and when done, there was a slight scoliosis to the right. Ankle jerks were both present, though the left was diminished. Lasegue's sign was positive on the left side at an angle of about 40 degrees. Neck bending sign was positive but Naffziger's sign was negative. He complained of parasthesiae of the lower and outer side of the left leg. There were no objective sensory signs. Pain was increased by coughing and movement. Rotation of trunk was slightly limited to the right, and on standing there was seen to be a scoliosis with the convexity to the affected side. There was a tender area in the left outer and upper quadrant of the left buttock. There was some wasting of left buttock.

33. Angus S. (contd).

X-ray examination. "Lumbar spine and pelvis, No abnormality seen in lumbar spine. In pelvis there is some asymmetry of the sacro-iliac-joints, but this is probably due to some rotation. No other abnormality seen. "

29/9/48. Patient was demonstrated at a meeting of inter-university students as a case of disc sciatica. The tender area in the left buttock was injected with 10 ccs of 2% Procaine and after a few minutes the left leg could be raised to fully 90 degrees. The students were much impressed and so was the patient. The patient was then manipulated without anaesthesia and walked easily. He was cautioned and told to return to bed for at least three weeks.

3/10/48. Patient's doctor informed me that his patient was so much better that he had insisted on going to work.

Discussion. This presented all the signs of a true 5th lumbar disc lesion. The presence of a tender area in the left buttock, which was relieved by procaine injection, does not exclude disc lesion. The mobilising of the affected leg by procaine, shows that the sign of Lasegue may be partly due to spasm of gluteal muscles preventing extension of the leg. Rapid improvement after injection and manipulation was most striking and not altogether expected. It was satisfactory that this could be demonstrated to a large number of medical students.

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34. David W. Age 34 years. Market garden labourer (Single)

Complaint. 5/10/48. Pain in the left leg and thigh for three weeks.

History. Patient, a well built man, stated that he had been having pain in the back of his left thigh and down the left leg for about three weeks. The onset was gradual. He noticed that there was a tingling feeling along the outer side of his leg and foot and that on walking, the foot felt rather numb. There was no history of injury. The pain was worse at night and kept him from sleeping. There was no dysuria or sphincter involvement. His previous health had always been good and he could not remember any illness since childhood. , He was a teetotaller and smoked 4 oz. in the week.

Examination. There was a scoliosis to the affected side and this was evident on forward bending, the back being held stiffly. There was no abnormality in Heart, Lungs, or Abdomen. The urine showed no abnormality. Teeth were artificial. Trunk rotation movements were not much restricted. The left ankle jerk was absent and the right diminished. The knee jerks were normal. Lasegue's sign was positive on the left side at 45 degrees. On straight leg raising to the angle of pain, allowing the sound leg to drop, increased the pain in the affected side. Neck sign was negative. There was hypoaesthesia in the lower third of the outer side of the left leg.

X-ray examination "Lumbar spine and sacro-iliac joints are negative ".

Tender areas. A tender spot was found in the upper and outer quadrant of the left gluteal region. The tender area was injected with 10 ccs of 2% Procaine and straight leg raising on the affected side was increased to 90 degrees.

21/10/48. Patient reported at the out-patient department. The relief from pain had lasted about one day after which the pain had returned but he had been able to sleep at night. Another injection of 2% Procaine was given, again with satisfactory result.

28/10/48. Patient reported again. He stated that he was much better and lumbar rigidity was much better. He was referred to the orthopaedic clinic for massage and postural exercises.

Discussion. Signs were those of a disc sciatica, 5th lumbar, involving the first sacral root. The ankle jerk was absent on the affected side, there were paraesthesiae of 1st sacral dermatome with hypoaesthesia. The usual tender muscular area was present in the upper and outer quadrant of the buttock on the affected side.

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35. Daniel D. Age 26 Labourer (Unmarried)

Complaint 26/10/48. Pain in the right hip, duration 1 month.

History. Patient stated that when rising from bed about a month previously, he was seized with acute pain

in the right hip and lower part of his back. He was unable to straighten his back and had to return to bed. Next day, he found that the pain had spread to his right thigh and leg. There was a history of a wetting at his work the day previous to the onset of the pain in the hip.

Previous history. He had always been healthy except for influenza and occasional "rheumatic" pains when he was in the Army during the 1939 war.

Examination. A healthy looking, well built man, showing no abnormality in heart, lungs, or abdomen. There was no abnormality to be made out in the central nervous system, knee and ankle jerks were present and normal. There were no parasthesias nor muscular wasting though the tone of the right gluteal muscles was a little impaired. Lasegue's sign was negative, as were neck and jugular compression signs. Forward bending was restricted and there was reduction of the lumbar curve. On palpation there was an area of deep tenderness in the upper and outer quadrant of the right gluteus, muscles. The urine contained neither albumen nor sugar and there was no dysuria. Rectal examination was negative.

X-ray report. No. 16268. "Bones appear normal except for small Schmorl's node in the upper border of L.V.3 ".

Treatment. The tender area in the right buttock was injected with 10cc.s 1% Novocaine and there was a very satisfactory result. During the injection, pain was felt down the course of the right sciatic nerve.

2/11/48. Patient reported at the out-patient's

department and stated that he was quite well. On examination there was still some deep "fibrositis" in the upper and outer quadrant of the right buttock. He wished to return to work and was allowed to do so.

Discussion. A case of right sciatica showing the signs of the upper gluteal syndrome, probably due to ligamentous strain and secondary to changes in the ligaments and interarticular structures of the lumbar spine. It was not a severe case and he had been resting for nearly a month before coming to the out-patient department. Lasegue's sign was absent and there were no reflex changes.

X-ray examination showed that there were degenerative changes in the lumbar spine, and the fibrositis of the hip was probably secondary to this. The response to Novocaine injection was good.

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36. Mrs. A.G. Age 48. Housewife (Married)

Complaint. Left sciatic pain, six months duration, gradual onset.

History. This patient had a severe attack of right sciatic pain nine years previously, which came on suddenly. Her present, left sciatica came on gradually following upon pain in the lower lumbar region and had begun about six weeks before her attendance at the out-patient department, 26/10/48. She was referred by her doctor as the patient was afraid that she was going to have an attack similar to the one she had had before.

Previous History had been healthy except for arthritis of

her left shoulder three years ago, and her attack of sciatica. She had two children confinements normal, and her menstrual periods continued normal.

Examination. Rather a thin, but otherwise healthy looking country woman. Teeth were artificial upper, and lower satisfactory. There was no abnormality of heart, lungs, abdomen nor central nervous system. There was no dysuria and no abnormal urinary constituents. She complains of occasional cramps in the Right leg, which she says have been present occasionally since her sciatica nine years ago. There is some sciatic tender-:ness in the middle of the left thigh. Lasegue's sign is negative on both sides and both ankle and knee jerks are present and normal. She says that there is some times stiffness on forward bending, but there is none when examined. Trunk movements were normal except for slight limitation of rotation to the right. There was no scoliosis. An area of deep tenderness was elicited in the upper and outer part of the left buttock.

X-ray examination No. 16282. "Bones appear normal except for slight spondylitis in the upper lumbar region".

Treatment. The signs inthis case were mild, but the patient was frightened of a recurrence of her sciatica of nine years previously. She was sent to the massage department for diathermy to the lumbar spine. She reported 16/11/48 very much improved and also reassured.

Discussion. This patient had evidently had a severe attack of right sciatica nine years before, probably disc. There were residual effects of this attack in

in the form of occasional cramps in the right leg. Her present attack was of gradual onset, and in the opposite leg. There were no neurological signs but there was an area of spasm in the left gluteal region probably due to spondylitic changes in the lumbar region

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37. Alexander P. Age 43. Motor Driver (Married)

Complaint. Left sciatic pain, six weeks duration.

History. About six weeks previous to attendance at the out-patient department, he began to feel pain and stiffness in his right hip. After about a fortnight the pain spread to the left hip and then down the left leg to mid calf region. He also felt tingling generally in the affected leg. The pain was increased on coughing and sneezing.

Previous History. "Pleurisy" in 1944. When in the army in Italy in 1943 he injured his back by falling down a hole. On that occasion he was in hospital for about twelve weeks. Patient is married and has five children. Teeth are artificial.

Examination. Trunk movements of rotation and hip joints are normal. There is some boarding of the lumbar spine on forward bending but there is no scoliosis. Lasegue's sign is positive at 45 degrees, on the left leg, and the right leg is extended normally. Neck sign and jugular compression are both absent. Knee jerks are normal and ankle jerks show slight diminution of the left only. There are tender spots in the left upper and outer gluteal quadrant and also to either side of the

lower lumbar spine in the lumbo-sacral-iliac triangle. There are no urinary or bowel abnormalities. Rectal examination shows no abnormality. Examination of heart, lungs, abdomen and central nervous system is negative, except for the diminished left ankle jerk.

X-ray examination. "Bones appear normal".

Treatment 11/11/48. The tender areas in both lumbo-sacro-iliac triangles were both injected with 10ccs of 1% Procaine and a modified manipulation of the lumbar spine was performed. The patient was instructed to raise the foot of his bed by a foot, with blocks, and to rest until he returned in four days time. He reported on 16/11/48, and stated that he felt better but although the back was improved, there was still some pain on walking in the left leg. The tender area in the left buttock was now injected with 10ccs of 1% Procaine.

18/11/48. Patient reported at out patient department He stated that he felt much better. There did not seem to be any difference between the ankle jerks on this occasion. It is likely that the previous difference was due to guarding.

Discussion. This case had a history of injury in 1943, but no sciatic pain until six weeks before attandance. The onset of pain was gradual and this combined with virtual absence of neurological signs or of scoliosis made it unlikely that this was a disc case. His occupation of motor driver is one in which sciatica is common. The response to injection of Procaine together with the negative X-ray findings, point to the case being

one of ligamentous strain in the lumbo-sacral region.

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38. Robert V.S. Age 61 Iron Turner (Married)

Complaint. 4/11/48. Low back pain with left sciatic pain.

History. This patient had had repeated attacks of lumbago and low back pain during the last ten years, this being the third attack this year. The present attack came on suddenly when he was on his way to work. His back suddenly became stiff and rigid and he had to go home to bed. This time the pain spread down his left thigh to about the back of the knee. There was no pain in the leg.

Previous history. Patient had always been healthy except for his attacks of lumbago, and there were no illnesses of note. He had three grown up children. Bowels were regular and there was no abnormality in heart, lungs, abdomen or central nervous system. Blood pressure was 160/90 . Rather an overweight flabby individual, but otherwise healthy looking. The teeth were artificial,

Examination. The back was held rather stiffly and there was flattening of the lumbar curve. Both forward and backward bending of the spine were painful, but rotation was free. Hip movements were normal (In spite of X - ray findings). Lasegue's sign was positive at 70 degrees, but knee and ankle jerks were present and normal. There were no sensory abnormalities, Neck sign and Naffziger's sign were absent.

38. Robert V.S. (contd).

There was a tender nodule in the upper and outer quadrant of the left gluteus.

X-ray examination. "there are marked osteoarthritic changes of both hips with hypertrophic lipping especially of the acetabular rims. There is some spondylitic lipping of the lumbar spine, but nothing to suggest prolapse of the disc ".

Treatment. The painful area in the left gluteal region was injected with 10ccs of 1% Procaine, but there was no effect. The patient was referred to the massage department for treatment by diathermy, and instructions were given for reducing his weight.

Discussion. The sciatic pain did not extend lower than the knee. There were no reflex or sensory changes, but there was limitation of movement of the lumbar spine and limitation of the lumbar curve. The X-ray picture was of osteoarthritis of the lumbar spine and the hip joints. Movements of the hip joints were however, painless and free. The case appeared to be osteoarthritis of the spine with secondary fibrositis, causing sciatic symptoms.

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39. Mrs. I.P. Age 48 Housewife (Married)

Complaint. Right sciatic pain, 4 years ago with recurr-:ence 14 months ago.

History. In 1942-3, there was a gradual onset of low back pain, X-ray examination at that time was negative. A few months later there was a sudden onset of acute pain in the right hip, radiating down the lateral side

of the right thigh and lower leg into the right hallux. This severe pain lasted for 2 - 3 months, relieved by aspirin, not associated with stiffness, not aggravated by coughing, no paraesthesiae or urinary symptoms. Intramuscular injection of Novocaine relieved pain completely for 2½ years. There was some residual stiffness in the right leg.

2nd attack. Nearly 14 months ago (October 1946) there was gradual onset of pain in the right buttock, radiating down a similar sciatic distribution into the big toe. Pain was fairly severe, worse on walking. There were paraesthesiae felt over most of the leg.

Patient was treated at Dundee Orthopaedic and Rheumatic Clinic for about seven months and pain and stiffness was somewhat relieved.

In December 16th 1947, I referred her to Mr. Smillie, Orthopaedic surgeon, who reported that in his opinion she was suffering from a prolapse of a lower lumbar invertebral disc.

Patient was then referred to Mr. Norman Dott in Edinburgh Royal Infirmary who reported as follows:-

Examination (by Mr. Dott). A very apprehensive lady, General Condition good. BP.140/84.

Neurological Examination. Weight bearing painful in the right lower limb. Normal lumbar lordosis. Forward flexion; total tilt to the right. Fingertips reach to within 3 - 4 inches of the ground. Localised tenderness paravertebrally to the left of L5-S1 interspace.

Lower Limbs. Slight flattening of the right glutei. No motor weakness.

Reflexes: Knee jerks present and equal. Right ankle jerk depressed. Plantar responses both flexor.

Sensation. Inconstant depression to pin prick in L5-S1 dermatomes on the right side. Small area of hyperalgesia to pin prick om medial border of 1st metatarsus on right side. Lasegue's sign positive on the right side at 70 degrees.

X-ray 18/12/47. Stereo Lumbo-sacral spine: negative.

Comment. Prolapsed intervertebral disc syndrome at lumbo-sacral interspace. Patient's name has been put on waiting list, but if symptoms subside spontaneously before admission, patient wishes to reconsider decision to operate.

9/1/48. Patient resumed attendance at Dundee Rheumatic Clinic where she was treated by infra-red and massage with injections of Novocaine on 9/1/48 and 7/2/48, but with only slight effect. By this time there was a marked nervous element appearing, and after a further examination at Dundee Royal Infirmary with X-rays on 26/8/48, when the report was again negative, it was decided that she should go to Mr. Dott's wards for operation. Mr. Dott reported that her condition was much the same as at his previous examination but that there was no muscular wasting.

Operation. Team: Mr. Hunter. Dr. Thomas.

The patient eas placed on the operating table in the prone position with low back presenting. Midline incision from L3 to S1 marked out. The area was then infiltrated with novocaine-adrenaline. The back was prepared and draped in the usual manner. Midline incision was then made from L3 to S1 and was carried through the interspinous fascia.

The paravertebral muscles were retracted bilaterally subperiosteally.

The lower portion of L5 lamina and of L4 lamina were then removed with rongeurs

The ligamentum flavum was then removed intact in both these interspaces. By retracting the root and dura at L4, the disc interspace was examined and was found to be firm with no abnormalities apparent,

At L5 there was no actual bulging of the disc interspace, but there did appear to be some adhesions involving the root which was retracted with a little difficulty. Upon palpating the disc interspace, it was found to be quite fluctuant. This interspace was then incised and with the use of rongeurs and small chisels the greater part of the disc substance and part of the disc cartilage were removed.

The open area in the disc was then covered with a small piece of fibrin foam. The nerve root was allowed to fall back into its normal position. A small piece of fibrin foam was then used in the 4th interspace to control slight epidural bleeding. A single layer of interrupted stainless steel wire sutures were then used to give good approximation to the paravertebral muscles and fascial planes. 10,000 units of penicillin in 10 ccs saline instilled in the wound before closure. Dry sterile dressing applied and patient returned to the ward in good condition.

Diagnosis. Degenerated intervertebral disc L5 on right.

Operation. Partial laminectomy L4 and L5 right with removal of degenerated disc L5.

39. Mrs. I.P. (contd).

13/11/48. Re-examination (Edinburgh). Patient is feeling well. Free from pain except for feeling of tightness under the knees. Wound well healed, not tender. Can bend forwards to 1 inch from ground. Lateral flexion full. Motor power good. Sensory - hyperaesthesia in S1 dermatome in right foot. Right ankle jerk depressed. Knee jerks brisk and equal. Patient has been warned to avoid back strain and heavy lifting for the next three months. She is to continue with her exercises of which she has been given a programme.

14/11/48. Discharged home.

26/11/48. Patient seen again by me at Dundee Rheumatic Clinic. Patient appears rather pale but feels much better. She is, however, rather more nervous than before. The wound is very well healed and the scar is not tender and is pliable. She can touch her toes. There is now no tender area in the right buttock, but instead there is a tender area in the left one.

I am afraid that owing to her nervous make up we have not seen the last of this patient. I think that it is desirable that she should not have too much physiotherapy in order that her neurotic element may not be fixed.

Result. On the whole, good as regards function and removal of pain, but as there is a pronounced neurotic element, prognosis should be guarded.

Note. The operative treatment was done with the minimum of trauma. Laminectomy was conservative and there was no attempt at fixation. This leaves a much stronger back and is preferable to the operative treatment usually done by orthopaedic surgeons.

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40. Andrew S. Age 48. Typewriter Mechanic. Single.

Complaint. Bi-lateral sciatic pain, 14 weeks duration.

History. About fourteen weeks before attendance at the out-patient department (23/11/48), patient began to feel pain in the lower part of his back, This appeared to be worse in cold and damp weather, and gradually spread down the back of his thighs to about the level of his knees. Pain was easier when he was in bed. He stated that on pressure in the upper and outer area of the glutei, pain tended to shoot down the back of the legs.

Previous History. His past health had been good except for digestive trouble of the duodenal ulcer type.

Examination. Rather a thin, tired looking man but appearing younger than his age. Teeth are artificial, tongue clean and bowels regular. Smokes twenty cigarettes per diem. Except slight epigastric tenderness, there was no abnormality to be made out in heart, lungs, abdomen.

Central nervous system. There were no paraesthesiae or sensory disturbances to be made out. Ankle jerks were present and equal. Knee jerks were normal and abdominal reflexes were present. There were no urinary or sphincter abnormalities. Lasegue's sign was positive at 50 degrees on the right leg and at 70 degrees on the left. Neck and jugular compression signs were negative. There was some lack of tone and wasting of both calf muscles. A tender area was made out in the upper and outer quadrant of each gluteal region. There was some limitation of forward bending but there was no scoliosis. Trunk rotation was free from pain except at extreme extent.

X-ray Report No.17754. "Slight lipping of margins of fourth lumbar vertebra, joint space not reduced. Otherwise the bones appear normal."

Treatment. Both tender areas in the glutei were injected with 10 ccs of 2% Procain and about five minutes after Lasegue's sign was negative.

30/11/48. Patient reported again at the out-patient depart-:ment and the injection of Procain was repeated. He stated that he felt better

2/12/48. Considerable improvement, patient can now touch toes. He was referred to the massage department for infra-red and massage treatment.

Discussion. Upper gluteal syndrome and referred sciatica due to "fibrositis" secondary to osteoarthritic and ligamen-:tous changes in the lower lumbar spine. Good response to Procaine injection and suitable for treatment by infra-red and massage. Patient's occupation required him to travel by car, and faulty driving position and draughty seat may have predisposed to the myo-fascial type of sciatica

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41. John R.S. Age 48 nSlaughterhouse Manager (Married)

Complaint. This patient came to the surgery on 30/11/48, complaining of severe left sciatic pain of three weeks duration.

History. Three weeks previously, when washing his face, he was seized with severe pain in the lumbar region, and was unable to straighten his back. The pain spread to his left hip and within a day or so extended down his left thigh and to mid calf region. The pain was increased on coughing and

sneezing. Within a few days he felt cramps and tingling in the sole of the left foot and in the outer side of the same foot. When passing urine there appeared to be some spasm of the anal muscles. He tried to keep at work, and succeeded in this until the day before reporting, when the pain was so severe that he had to give up.

Previous History. There had been several previous attacks of lumbago, the first two year's previously following upon lifting a bed. He was a keen gardener, but had had difficulty of late owing to discomfort when doing much stooping. Apart from this he had always been healthy. Appendicitis in 1917.

Examination. A tall, rather thin man of healthy appearance. The lumbar region held stiffly and slightly bent forward. There was flattening of the lumbar curve and scoliosis with the concavity to the affected side. Lasegue's sign was positive on the left side, and the ankle jerk was much diminished. Neck sign and jugular compression sign were negative. There was lack of tone in the left buttock and thigh, posterior aspect. There was marked tenderness in the lumbo-sacro-iliac triangle on the left side, and in the upper and outer quadrant of the left gluteus. In the lumbp-sacro-iliac triangle, there was definite craaking on pressure, but no tenderness over the lower lumbar spines. The tender area in the upper and outer quanrant of the left gluteus showed the usual nodular spastic condition "fibrositis." Tenderness was elicited down the course of the sciatic nerve to the popliteal region and exterior to the head of the fibula. The hamstring muscles were also tender on pressure. There were no objective sensory changes to be made out, but

the left foot felt distinctly colder than the right. Both dorsalis pedis arteries pulsated normally. Rectal examination elicited tenderness high up, in the region of the left pyriformis muscle. There were no abnormalities in heart, lungs, or abdomen. The urine did not contain albumen or sugar. Teeth were artificial. He smoked fifteen cigarettes per diem and drank an occasional pint.

X-ray examination 5/12/48. "Lumbar spine negative. Sacro-iliac joints appear normal".

Treatment. Patient was placed in bed, with the lower end raised about a foot; the position recommended by Farkas (1947) The painful areas in the buttock and the lumbo-sacro-iliac regions were injected with 10ccs of 1% Procaine, but there was little or no effect, except that the creaking, previously noted, was now absent. Patient was visited at two daily intervals up to 16/12/48, but there was no significant change in his condition except that the pain was much diminished at rest. Pain continued to be worst at night, and on movement. The left ankle jerk was then lost, and raising of the right leg caused pain in the lower lumbar region of the spine, though at a much greater angle than on the left side. Lasegue was positive on the left side at about forty degrees. At times the patient can lie in bed without any pain but at other times the pain is severe especially at night. Pain is fairly well controlled by aspirin in 10gr. doses at three hourly intervals.

Discussion. This is evidently a case of displacement of the fifth intervertebral disc. There is a history of trauma and previous attacks of lumbago. There are several special

features in this case viz.anal spasm, creaking to the left of the lower lumbar spine and pyriformis tenderness on rectal examination. There was little or no response to Procaine injection except temporary increase of the angle of Lasegue. The angle at which Lasegue's sign is positive, about forty degrees, and the persistence of symptoms in spite of favourable rest conditions makes the prognosis in this case rather poor, and it seems likely that operation may be necessary eventually.

3/3/49. The gloomy prognosis has not been fulfilled - patient improved rapidly eventually and was able to return to work at end of February 1949 - very well.

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42. Mrs. E.H. Age 28 Housewife.

Complaint. This patient was seen at her home on 8/11/48, when she was complaining of severe pain of left sciatic distribution, of one day's duration.

History. On 7/11/48, when stooping down to pick up a brush, she was seized with severe pain in the left gluteal region, the pain rapidly extending down the back of her left thigh and leg. She was completely disabled andhad to be lifted into bed.

Previous History. There had not been any previous attack of sciatica or lumbago. Her previous history had been healthy except that she had had a mastitis after the birth of her first baby, born in August 1948. The mastitis was treated surgically in September 1948, and she had made a good recovery. Her father and mother had died about a year previously of malignant hypertension, the father having a positive W.R.

Examination. Patient was lying in bed and complained of severe pain down the back of her left leg and in the small of the back and left hip. On standing, there was a scoliosis with the concavity to the affected side. The back was boarded in the lumbar region. Rotation of the trunk was limited by pain when turning to the right in fact most movements of the trunk were objected to. Lasegue's sign was positive on the left side at about forty degrees. Both ankle jerks were present and equal. Neck bending increased pain in the lower lumbar region. Jugular compression was negative. Knee jerks and abdominals were present and normal. There were no disturbances of sphincters. There was marked fibrositic tenderness in the upper and outer quadrant of the left gluteus, and there was loss of tone in the left hip. Menstrual functions and bowels were normal. There was no abnormality in the urine. Heart, lungs, abdomen and central nervous system except for the above signs, were normal. Patient complained of paraesthesias of the outer side of the left leg and dorsum of left foot. There were no objective sensory disturbances, though there was some tenderness along the course of the left sciatic nerve and hamstrings.

Treatment. Patient was placed in the position of maximum rest, with the foot of the bed raised about a foot. A firm pillow was placed in the lumbar region, to restore the lumbar curve. This was well tolerated and persisted in by this patient. Powders containing aspirin gr.x, Phenacetin gr.iii, and Caffein Cit.gr.ii were given three hourly with good effect. No other treatment was given. Improvement was satisfactory

and on 1/12/48 she was allowed up. Lasegue was then negative, and she was free from pain. She was allowed out on 7/12/48, and was seen again on 14/12/48 when there was no complaint at all.

Discussion. This was a case of disc sciatica with a history of minor trauma, stooping. There was the usual area of tenderness in the gluteal upper and outer quadrant; upper gluteal syndrome, and in addition a positive Lasegue sign on the affected side together with a positive neck sign. The ankle jerks were present, but there were paraesthesias of the outer side of leg and foot, and there was some loss of tone in the gluteus muscles on the affected side. The response to position of rest was very satisfactory and there seemed to be complete restoration of function and disappearance of pain. It is likely that the displacement of the disc was not great, and that the inflammatory reaction subsided quickly, the patient having been rested almost from the beginning. X-ray examination was not carried out in thiscase.

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43. Mr. F. K. Age 22 General Labourer (Single)

Complaint. Left sciatic pain of two years duration.

History. Two years previous to attendance at the out-patient department, and six months after a fall from a height, he began to feel pain running down the back of his left leg, from the hip to the ankle. The pain was throbbing in character and was relieved by rest. During the last two weeks, the pain had been much worse, and his doctor referred him to the out-patient department.

Previous History. Apart from a doubtful history of "Pleurisy", at the age of fifteen, he had always been healthy.

Examination 18/11/48. A well built young man, walking with a slight limp. In the erect position and accentuated by forward bending, there is seen to be spasm of the lumbar muscles and scoliosis to the right. Sciatic tenderness was present from the sciatic notch to the back of the calf muscles. Gluteal wasting was fairly marked and there was general hypotonus of the muscles of thigh and leg. Lasegue's sign was positive at about 30 degrees on the left side the right being unaffected. The left ankle jerk was absent and there was pseudo-clonus on the same side. There were no objective sensory changes, but patient complained of occasional tingling sensations in the leg from the back of the knee to the calf. There were no other changes in the central nervous system. Other systems were normal except for some flattening of the left chest. The Urine did not contain albumen or sugar and there was no dysuria.

X-ray examination. No. 17731. "Bones appear normal". Patient was instructed, to lie up at home with the foot of the bed raised by about one foot, and to take aspirin gr.10 every four hours, and to report in a fortnight's time. He did not report again until 16/12/48, when his condition was very much the same. The upper and outer quadrant of his left gluteus was injected with 10ccs of 2% Procaine, but without much effect.

6/1/49. Patient reported again at the out-patient department, and although the pain was now easier, there was still scoliosis the ankle jerk was absent and Lasegue was positive at about

forty degrees. He was referred to Mr. Campbell F.R.C.S. as a suitable case for plaster fixation.

Discussion. The long history with neurological signs and muscular wasting combined with scoliosis and lack of response to injection of Procaine, point to a diagnosis of a lesion of the disc between 4th and 5th lumbar vertebrae.

Later, seen at Medical Out-patient department 1/2/49. Patient is comfortable and free from pain in his plaster.

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44. Mr. A.S. Age 55. Waterworks attendant (Married)

Complaint. Right sciatic pain of about two months duration.

History. On 12/10/48, when stooping, he experienced severe pain in the lower part of his back. During the next week, the pain gradually spread to the back of his right thigh, calf, dorsum and sole of the right foot.

Previous History. He had always been healthy with the exception of appendix operation in 1937, a dental operation in 1921. He had had a similar attack of low back pain in 1939, but on that occasion it had passed off quickly, and did not spread to the leg. He is married and has five children, all healthy.

Examination. 21/12/48. A slim healthy looking man, appears younger than his age. There is no abnormality to be made out in Heart, Lungs, Abdomen. Teeth are artificial, tongue is clean. Blood pressure is 140/80. He smokes about ten cigarettes daily and is teetotal. Urine does not contain albumen or sugar. Patient walks with a slight limp and there is a scoliosis, convex to the left, with boarding

of the lumbar spine. There is considerable wasting of the right gluteal muscles and also the right calf muscles, with lack of tone. There is a tender area in the right upper and outer quadrant of the gluteus and also in the right lumbo-sacro-iliac triangle. In addition, there is pain on pressure in the region of the right sciatic nerve down to the level of the back of the knee. He complains of paraesthesias of the outer side of the right leg and foot. Lasegue's sign is positive on the right side at 45 degrees and on the sound leg, at 70 degrees. Knee jerks are present and equal, and both ankle jerks are present, though the right is diminished. The Neck sign is present. There are no sphincter disturbances. Rectal examination is negative.

X-ray examination No. 19364. There is slight narrowing at the right side of the spine, between L.4 and 5, which might be due to lateral pulsion of the disc. Slight spondylitis is evident throughout the lumbar spine, but the pelvis appears normal ".

Treatment. As there was some tilting of the pelvis, owing to the lumbar scoliosis the patient was instructed to have the left heel raised by about half an inch. He was sent home to bed and told to have this raised by about one foot at the lower end, as recommended by Farkas (1947). Patient reported a month later and stated that he was now much better. The pain in the back was much less and also the thigh. He still complained of tingling and some pain in the outer side of the right leg, especially at night. He was instructed in remedial exercises, leg swinging and trunk swaying exercised and told to persist with his bed raised. The scoliosis was compensated

for by raising the left heel and posture is much improved by this. This patient was seen at fortnightly intervals and has made steady progress. When last seen 17/3/49, he could touch his toes and walked well. He stated that he was practically free from pain. The muscular wasting was now less.

Discussion. In this case, there was the history of low back injury followed by sciatic pain, typical of disc injury in this case fourth and perhaps fifth discs. X-ray examination on this occasion rather pointed to this diagnosis. This patient, being an intelligent man, has carried out treatment prescribed, and his progress has been good. The position of maximum rest appears to have aided recovery.

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45. Mr. John M. Age 53. Occ. Street pavior (Married).

Complaint. Pain in right hip and down the front of right thigh.

History. Patient states that he got wet on 23/12/48, and on 1/1/49, he had severe pain in the right hip and down the front of the right thigh, extending to about the knee.

Previous History. "Pleurisy" in 1913, Hernia operation in 1917. Apart from this he stated that he had not had any serious illnes. A married man with three children who were well and healthy. He smokes ten cigarettes per diem and takes an occasional pint.

Examination. A healthy looking man. Upper teeth are artificial, lowers are absent. There is no abnormality to be made out in Heart, lungs, Abdomen and Urine contains no

abnormal constiuents. There is, however, occasional frequency of micturition. There is no scoliosis but lumbar spine shows some boarding on bending forward. There is marked tenderness in the upper and outer quadrant of the right gluteal region and also to the right of the third lumbar vertebral spine. Lasegue's sign is negative and ankle jerks are present. The neck sign is not present. The right knee jerk is diminished. There is wasting and lack of tone in the right buttock and thigh. Trunk rotation and joint movements are normal. Rectal examination is negative.

X-ray examination. "Lipping of anterior and lateral superior margins of fourth and fifth lumbar vertebrae, but there is no alteration in joint spaces. Pelvis appears normal ".

Treatment. On 18/1/49, the painful areas in the right gluteal region were injected with 10ccs of 2% Procaine, with good effect. This was repeated two days later and again on 25/1/49. The pain in the buttock was much less and the chief complaint was of heaviness in the leg generally.

19/3/49. Patient's doctor states that this man is now back at work and has been for about a fortnight.

Discussion. This appears to be a lesion of the third disc, Cotugno's anterior sciatica. There is in addition the upper gluteal syndrome, due to involvement of the fourth disc. There was no involvement of the ankle jerks but the right knee, reflex was diminished. The response to Procaine injection was good, as would be expected in a case with much secondary fibrositis of the upper gluteal region.

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46. John McI. Age 55 Fireman (Married).

Complaint. Left Sciatic pain of about six weeks duration.

History. Patient was referred to the out-patient department 10/2/49. He stated that about six weeks before, he began to feel pain in the region of the outer side of his left leg, and that this spread to the back of the same thigh and hip. He had had a similar attack about one and a half years previously, and at intervals of six months since then.

Previous health. Lobar Pneumonia in 1947, otherwise no illness of note. Smokes 10 gigarettes daily and is a teetotaller.

Examination. 10/2/49. A healthy looking man, married, with two children alive and well. Patient walks with a slight limp, and on standing, has a mild degree of lumbar scoliosis with convexity to the right. Teeth are artificial with the exception of two of his own lowers. There is no abnormality in Heart, Lungs, Abdomen or Urinary systems. Blood pressure is 120/80. Pupils react to light and accomodation. Knee and ankle reflexes are normal. Lasegue's sign is absent, but there is some pain in the sacral region on performing this test. Neck sign is not present. There are no objective sensory findings, but he says that there is some tingling at times in the outer side of the left leg. There is some wasting of the muscles of the left buttock, but this is not marked. There is tenderness in the region of the left sacro-iliac joint, but there is no sciatic tenderness. Trunk movements are only slightly limited in rotation, but there is some boarding of the lumbar muscles on forward bending. Rectal examination is negative. There is a moderate degree of flat

foot on the affected side.

X-ray examination No. 2460. "Lumbar spine and sacro-iliac joints are negative.

Treatment. Patient was instructed to lie up at home with the foot of his bed raised by one foot, and to report in a fortnight's time. On re-examination, he was found to be improved and was shown exercises for the treatment of his flat foot and for the trunk.

22/3/49. Patient reported at the out-patient department and stated that he felt well and wished to return to work. He was allowed to do this, and was told to continue to sleep with his bed raised and to avoid stooping with the knees straight, and to guard against postural faults.

Discussion. A case of left sciatica probably due to lesion of the fourth disc, with characteristic recurrences. The flat foot may have been secondary to previous attacks and predisposed to recurrence of sciatica due to postural deformity. There was a good response to conservative measures.

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47. Eliz. W. Age 37 Clerkess, (single)

Complaint. 8/2/49. Low back pain with sciatic symptoms and recurrences.

History. Patient states that she has had lumbago in 1940, 1947 and in December 1948, this was followed by left sciatica. She recovered from this attack, but about a week before attendance at the out-patient department, she had another attack of lumbago when lighting a fire, and this was followed by sciatic pain in the left leg, which persisted at

at the time of examination.

Previous History. Diaphtheria at the age of eight. Strain of the back sixteen years ago and rheumatic fever at the age of eighteen.

Examination. A stoutish rather flabby but otherwise healthy looking woman who appears younger than the age stated. The ankles are rather thick, and the circulation of the legs is rather poor. She states that her bowels and menstrual periods are regular. Heart. There is a short presystolic murmur at the mitral area with a slapping first sound and partial duplication of the second sound. The apex beat is in the normal situation. Lungs, Abodmen and Central nervous system show no abnormalities. Urine contains neither albumen nor sugar. There is no dysuria. Trunk movements are normal in rotation, but there is limitation of forward.bending with boarding of the lumbar muscles. Lasegue's sign is not present, but there is some pain in the sacral region on carry-:ing out this test. Ankle jerks and Knee jerks are normal. There is no muscular wasting and no sciatic tenderness on pressure. In the lumbar region there is marked tenderness on pressure on either side of the spine, extending from the second lumbar to the sacrum. There are no objective sensory disturbances in the left leg. There is no scoliosis.

X-ray examination. No.2334. "No abnormality is seen in lumbar spine and pelvis."

Treatment. Patient was referred to the massage department for Infra-red and massage.

22/3/49. Patient reported at the out-patient department and stated that she had no complaint.

Discussion. The past history of rheumatic fever suggests that there are degenerative changes in the ligaments and discs of the lumbar spine. There were no alterations in the ankle or knee jerks and no sensory objective changes. There was secondary fibrositis on either side of the lumbar spine. The response to physical treatment was good, but it is likely that she will be liable to recurrence if she is subjected to strain or to climatic changes. There was no involvement of the gluteal region which suggests that there is not yet any actual protrusion of a disc but that the sciatic symptoms are due to an inflammatory condition in the neighbourhood of a disc involving the fourth left nerve root.

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48. Mary. C. Age 50 years. Dress cutter (single)

Complaint. Right sciatic pain.

History. This patient was seen in consultation at her own house. She had nursed her mother for many years and this had involved much heavy lifting. About Christmas 1948, she had an attack of low back pain which came on suddenly and gradually spread to her right leg. At the same time she had an attack of shingles affecting her left shoulder. She remained in bed for about three weeks and then resumed work. On 17/1/49, the pain returned and was more severe than before, She described the pain as "gnawing", in the hip and leg and it kept her from sleeping.

Examination. 24/1/49. Previous history was healthy. There are now menopausal symptoms. A thin nervous woman apparent-:ly worn out by her previous nursing duties and by the pain of

her sciatica. Teeth are artificial, appetite is poor and she appears tired and anxious.

There is no abnormality in Heart, Lungs, Abdomen but the examination of the central nervous system shows the following :-

Knee jerks are present and normal, the ankle jerk on the right side is absent. There are paraesthesiae of the middle third of the outer side of the right leg with some blunting of sensation over the same area. There is marked wasting of the right buttock, thigh and leg.
Lasegue's sign is present on the right side at 30 degrees and on the left side at 45 degrees. There is marked lumbar scoliosis with the concavity to the affected side. Tenderness is most marked at the right sacro-iliac joint and the right gluteus, upper and outer quadrant. Both these areas were injected with 5 ccs of 2% Procaine, but without effect. On standing, the lumbar scoliosis is very marked and forward bending is limited and accentuates the scoliosis. Pain is increased by coughing and sneezing. There is tenderness on pressure over the last two lumbar spines.
X-ray examination, 1/2/49. "Lumbar spine negative. Sacro-iliac joints show slight marginal sclerosis of doubtful significance ".
Treatment. Patient was instructed to remain inbed in the position of P.M.R. (Farkas ½ and was supplied with analgesics.
15/3/49. Patient was seen again at her own house. There was practically no change in her condition, though she was sleeping better. She was very emotional. She is to be admitted to the wards of Dundee Royal Infirmary.

48. Mary C. (contd.)

Discussion. A severe case of sciatica due to disc prolapse of fourth and also probably fifth, not responding to medical treatment. I do not think that this case will improve without surgical treatment, The pronounced emotional element in the case makes it advisable however, not to operate without allowing longer time for possible change.

16/5/49. Patient reported D.R.I. - planter removed to-day. No complaint, walks well, no deformity.

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49. Daniel D. Age 67. Night Watchman.

Complaint. Pain down the back of the left leg of four years duration.

History. This patient was referred to the out-patient department by his doctor on 22/3/49, as a case of left sciatica. The patient stated that he had had pain in the left hip and down the back of the left leg for about four years with exacerbations, and that the pain was worse on walking and going downstairs. He was a married man with eight children, all of whom were alive and well. He had served in the South African war as well as the two German wars and had always had good health apart from his present. illness.

Examination. A healthy looking elderly man, walking with a slight limp. Trunk movements were normal except that forward bending was limited to a slight extent. There was a lumbar scoliosis with the convexity to the affected side. Lasegue's sign was negative. Ankle and knee jerks were present and normal on both sides. Neck sign was absent. There was

no Sciatic tenderness and no paraesthesias, but pain was complained of down the back of the left leg to about mid calf. There was some muscular wasting in the left buttock and thigh. Internal rotation and, to a lesser extent, external rotation of the left hip joint was resisted and painful. Flexion of the left knee was painful owing to old cartilage trouble. There was deep tenderness in the left groin and in the region of the great trochanter. Examination of heart, lungs, abdomen and central nervous system showed no abnormality. Blood pressure was 160/94. Rectal examination showed slight general enlargement of the prostate. There was no dysuria and no abnormality in the urine.

X-ray examination No.4785. "Old osteoarthritis of left hip, with spondylitis and rotation of the lumbar spine."

Discussion. The absence of Lasegue's sign, sciatic tenderness and the presence of ankle jerks together with the limitations of rotation and general movement of the left hip joint showed that there was a lesion of the hip joint, and that the pain down the thigh and leg was referred from that joint. The X-ray examination confirmed this. The wasting of the left buttock and thigh was arthritic wasting. The general appearance on examination differs markedly from that shown by a sciatica caused by a disc lesion or by ligamentous change in the lumbar spine, and should not readily be confused with it.

Treatment. Patient was referred to an orthopaedic surgeon for opinion as to whether a cup operation might be indicated.

TREATMENT.

As the conception of sciatica has altered, so has the treatment. From the time of Cotugno up to the early twenties of the present century, the theory of neuritis held the field, and treatment had the cure of neuritis for its object.

Many and barbarous were the "cures", ranging from the actual cautery, blisters, aided by injection of clysters of various sorts, to stretching of the nerve.

Sir Arthur Hurst (1943), in an article in the British Medical Journal, which he called "A Study in Debunking", described many of the fads and fashions in the treatment of sciatica. This article, if not actually helpful, at least sheds the light of history upon the efforts to find out and treat this common disorder.

The condition was essentially a medical one and so it remains, but with the difference that if medical means fail, in certain cases, scientific surgery may be expected to cure or, at least, remove the pain.

It may be said, in the first place, that the majority of sciaticas will respond to rest, both physical and mental, and that particularly no case should be operated upon without first having adequate medical treatment.

MEDICAL TREATMENT.

Medical treatment may be divided into:-

(a) General
(b) Special.

(a) GENERAL:

The patient should be put to bed and should remain there for about three weeks or until some days after symptoms have abated aufficiently that getting up does not increase discomfort.

The position in bed should be that of what Farkas (1947) calls "the fundamental position of rest"; that is, the lumbar lordosis should be preserved as far as possible. This is achieved by raising the foot of the bed by from five to twenty inches, and by placing a firm pillow below the lumbar spine in order to preserve the normal lumbar curve.

Flexion of the spine opens out the posterior aspect of the intervertebral spaces and tends to cause further pro-:trusion of the ruptured disc. In maintaining lumbar lordosis, this tendency is overcome and rest of the injured part is secured.

The ordinary position in bed where the patient is propped up by pillows tends by itself to produce low back pain even in patients who are not suffering from sciatica. This position differs little from that assumed when Lasegue's sign is elicited, the leg being in the same relative position to the trunk, and so it is not to be wondered at, that pain is increased in this position.

At first, extension of the lumbar spine may be resented by the patient but after the initial spasm is overcome, he will find for himself that this position affords rest.

When pain has diminished, the prone position may be allowed as a change and this position too favours the preservation of lumbar lordosis.

The bed should be moderately firm, and if necessary, strengthened by a bed board when the mattress sags.

In addition to fundamental rest, analgesics are usually required, depending upon the severity of the pain.

In a severe case it may be necessary to give an initial injection of Morphine ¼ gr., but this should rarely be repeated owing to its habit forming property. Lately I have been using Pethedine 100 mg. at the beginning of the attack, and repeated at four hourly intervals during the first day or so if necessary. There is no doubt that Pethedine is also habit forming, but probably not to the same extent as Morphine, and it has this advantage that it can be given by mouth and other tablets substituted when the need for the more active drug is passed, without the patient being aware of the nature of the previous drug.

In less severe cases Aspirin, either by itself or in the combination with Phenacetin and Caffeine Citrate, is usually effective when given at suitable intervals. I have observed that the analgesic effect of aspirin gr.10 with phenacetin gr.5 and caffeic citrate gr.2 passes off in about three hours. This gives some guide to the frequency of administration.

Heat:

The reaction to heat varies greatly from case to case.

At the beginning, heat is often resented in acute cases and appears to increase pain, while in other cases it gives welcome relief.

In domestic practice heat may be applied by the hot water bottle or by the thermal blanket, while in hospital

the infra red lamp is often satisfactory. Generally speaking, the more penetrating heat of diathermy tends to make pain worse and should not be used in the early stages, but in later stages, however, it may be of service.

The kaolin poultice frequently gives more relief than do more complicated measures, and may be applied to the lumbo-sacral region and the buttock at twelve hourly intervals.

Sleep:

As sciatic pain usually tends to be worse at night, the patient will be apt to look forward to that time with apprehension, so that it is essential that steps be taken to afford sleep. Dover's powder may be sufficient in many cases and the barbiturates, such as, Soneryl, especially when combined with aspirin, are useful in obtaining rest, though in the elderly, barbiturates are not as a rule very successful and tend to cause confusion rather than restful sleep. In the elderly there is not the same objection to opiates and Nepenthe is probably the most effective hypnotic.

Massage:

While massage is sometimes of value in the later stages of sciatica, it has no place in the treatment of the acute stages and should be avoided.

Unless specially warned, the enthusiastic masseuse tends to apply her treatment to the nerve trunk and this will certainly increase pain.

The trained modern masseuse, however, knows to avoid the nerve and in the later stages may give great comfort, both physical and physological by her attention to the painful areas in lumbar and gluteal regions.

The attempt to rub away painful nodules is, in my opinion, unsound in the treatment of sciatica, and massage should rather be of the stretching of muscles by gentle kneading, rather than by the more vigourous deep measures.

Novocaine and allied substances:

There is considerable difference of opinion as to when injections of this group of substances should be used. Some authorities maintain that they should be avoided during the acute stages. They maintain that the effect is only temporary in most cases, and that the return of pain will upset the patient. However, there is no doubt that very considerable relief follows from novocaine injections, especially into the upper and outer quadrant of the gluteal muscles, and it is such a simple procedure that it may be repeated when required. For that reason I do not think that it should be withheld in the acute period and, from experience, I have found that in many cases the effects are not temporary but frequently lead to rapid improvement of a lasting kind. The psychological effect of finding that a leg can be raised to a right angle without pain, when previously it could be moved to a slight extent only, certainly outweighs a measure of disappointment when the pain returns, perhaps to a much less degree.

The important point is to find the area of maximum tenderness and if during injection pain is found to shoot down the leg a good result is almost sure to follow.

The strength of the analgesic solution varies with different operators.

I prefer to use ½ to 2% procaine solution, in from 40 ccs of the ½% to 10ccs of the 2% strength. It is better to avoid the addition of adrenalin to the solution, as there are many individuals who are sensitive to this drug, and its use frequently leads to tremor and faintness, especially in the elderly. A few cases of sensitiveness to procaine have been noted, but so far, only transient dizziness has been observed in a few of my cases.

Incoordination in the injected limb is fairly common, but passes off in a short time in ambulant cases when the leg is rested.

It is difficult to account for the beneficial effect of procaine injected into the painful area of the upper and outer quadrant of the gluteal muscles, when this area is involved, as it often is in disc cases.

Leigh has pointed out that upper gluteal tenderness, sometimes called fibrositis, indicates implication of the primary posterior division of the fifth lumbar root, and Elliot by means of his electromyographic studies has shown that the tenderness is probably due to spasm.

It may be that by anaesthetising the spastic area, movement is allowed, which liberates the disc protrusion. Certainly after abolishing the gluteal pain, manipulation of the spine without anaesthesia (general) is usually worth trying.

(b) SPECIAL:

Leaving the discussion of surgical treatment to the last, there are a number of medical and orthopaedic

procedures which should be mentioned.

1. Massage:

As has already been said massage should not be employed in the early stages. Massage may be divided into

(a) General
(b) Local Massage.

(a) General Massage may be used to keep up the muscular tone of the patient. It improves circulation and probably has a psychological as well as a physical effect. At the present time owing to the shortage of physiotherapists, general massage is probably wasteful, but where this shortage does not exist, the treatment is undoubtedly helpful.

(b) Local massage.

When the acute stage is past, massage is of value especially when applied to the gluteal and lumbar regions, but care should be taken that no massage should be applied to the nerve itself, for in this situation massage can only do harm.

In Dundee Orthopaedic and Rheumatic Clinic a large series of cases was treated by massage of the upper and outer quadrant of the gluteas only, under the impression that this was the seat of the origin of the sciatica.

My impression is that though the results were good in most cases, the greatest measure of improvement seemed to come after the massage was stopped.

The object of the massage was to disperse nodules in the buttock, but if Elliot and Cyriax are correct, these nodules are not present as such, but are areas of spasm or muscular activity secondary to a spinal lesion.

I think that a better result can be obtained and more speedily by injection of procaine into the painful area.

In the lumbar region, massage designed to stretch the lumbar muscles is certainly comforting to the patient and is effective in cutting short residual spasm and boarding of this region.

Infra-red radiation as a preliminary to massage increases the effectiveness of the latter.

2. General Orthopaedic Treatment.

The stability of the human vertebral column depends upon the integrity of the dorsal and lumbar courves as well as that of the bony and ligamentous of which it is composed. When the patient has recovered sufficiently to be able to leave his bed, he should be instructed how to adopt and maintain the optimum posture which lessens strain on the lumbar region and allows healing to take place, at the same time preventing recurrence of sciatica.

Normally the synergist muscles of the trunk operate automatically in perfect balance, but when pain is experi-:enced in one group, spasm is caused, leading to overaction and postural deformity of a protective nature such as scoliosis and loss of the normal lumbar lordosis.

The object of treatment is to restore this balance as far as possible, by correcting deformity by orthopaedic means if necessary, as well as by carefully graduated exercises, designed to preserve the normal curves of the spine. Forward bending should be discouraged at least for some time, as this position tends to open out the posterior

disc spaces and may lead to recurrence, and where it is necessary to pick up some object a squatting position should be substituted for trunk flexion.

The essential condition is to preserve the lumbar curve and where a patient has had an attack of sciatica with definite disc symptoms he should, if at all possible, avoid employment which involves heavy lifting and back strain.

Hobbies such as gardening and golf should be avoided until all signs of low back pain have disappeared.

A residual scoliosis is often seen in convalescence and this may hinder progress. Correction of these faulty pos-:tures may make all the difference as regards rapid recovery and, happily, very simple measures such as correcting foot-wear by raising the heel on the side to which the pelvis is tilted, will suffice to do this.

Remedial exercises:

The services of a skilled physiotherapist are very valuable in teaching the patient to carry out exercises designed to improve the tone of the back muscles and restore the proper bodily balance.

Lateral movements of the pelvis relative to the spine are beneficial.

These movements are in the nature of a "shimmy", the pelvis being swung rhythmically from side to side, while the shoulders are kept as steady as possible. Turning movements of the trunk are now begun. These also should be rhythmical all jerky movements and all stiffness in execution being avoided. The object is to encourage the patient to use his

muscles easily, and to overcome the fear of movement which causes him to adopt defensive positions. At the same time an early resumption of ordinary movements, as distinct from organised ones, is important. I have seen cases in which too much insistence on the medical aspect of movements has prolonged convalescence and has had a bad psychological effect, whereas had the patient carried out some necessary household duties, he or she would have forgotten the ailment and have strengthened the muscles unconsciously.

I feel that sometimes the idea of "rehabilitation" as a substitute for the older fashioned idea of getting fit to work again, has this effect.

No patient should be allowed to use a walking stick, as not only does this lead to postural abnormalities but becomes to the patient a link with his illness and a symbol of the invalid.

Subsequent Progress:

While the painful and disabling period of sciatica passes off relatively rapidly, full recovery of the affected leg may take many months, in fact, unless the patient attends to certain fundamental details of posture, he may experience recurrence from time to time.

These fundamentals are: Sitting and standing positions should be maintained in which the lumbar curve is preserved, that is, when sitting in a chair the patient should not lounge but sit with a hollow back, if necessary with a cushion in the small of the back, while he should stand equally on both feet. The same height of boots or shoes should be worn

from the time of rising till bedtime, and if stiffness is felt in the back when work is being performed, the patient should be careful to hyperextend the lumbar spine for a few moments by backward bending in order to overcome spasm. Heavy lifting should be avoided.

SURGICAL TREATMENT.

Where medical treatment has not been successful, or where pain is so severe that the patient insists on "something being done", and where the condition is definitely due to disc prolapse, surgical treatment may have to be employed.

Surgical treatment is not indicated unless there has been a full examination and a sufficient trial of medical methods.

This is stressed by Aitken and Bradford (1947), in an article in the American Journal of Surgery, in which they say "No patient should be operated on without adequate rest and conservative treatment."

In a series of 170 cases collected from the files of an American assurance society, there are five deaths from operation. Three died on the operating table, two of anaesthesia and one from cardiac dilatation. Two died a few days later from pulmonary embolus. In two of the cases which died, no disc was found at operation. The operation cannot, therefore, be deemed a trivial one.

As a rule the more expert the operator the less interference with bony and ligamentous structure is necessary. The neurological surgeon operates with the minimum of trauma,

while the orthopaedic surgeon tends to perform laminectomies and secondary fusions. In any operation of the spine, the most important point is, not to interfere with the articular facets, for if these are damaged, the stability of the spine is greatly impaired.

It is for this reason that some surgeons tend to perform primary fusion operations.

Aitken and Bradford stress the importance of liason between physician and surgeon and of careful preliminary investigation before operation.

They point out that the result of myelograms is only 50% accurate, opaque fluid being more accurate than air, but defects are extremely high in both.

In their series of 170 cases operated on as disc lesions, no discs were found in 67 cases, representing 40% of the total. Reflex changes were found in 58% of cases where discs were found and in 43% where there were no discs. They point out that this shows that reflex changes merely show that there is nerve irritation, but not necessarily within the neural canal.

The great majority of discs were found either at the fourth or fifth lumbar level. In the entire 103 cases, 50 were at the fourth, and 40 at the level of the fifth, while three were reported at the level of the third space.

They classify the results as follows: "Excellent - if the patient had no pain and was able to return to work of any type. (2) Good - if the patient had only mild discomfort, but was capable of all but the heaviest work. (3) Fair - if the patient had pain and could do only the

"lightest type, such as, guard duty or sendentary work. (4) Poor - if the patient had persistent pain and failed to return to any form of work. (5) Bad - if the patient was worse than before operation and was considered to be totally and permanently disabled."

	Excell.	Good.	Fair.	Poor.	Bad.	Fatal
Discs 93 cases	20	22	26	24	8	3
No Discs 67 cases	2	7	17	24	15	2

Table of operation results. Aitken and Bradford 1947

These results include cases where there were pronounced psychological upsets, and serve to show that results are bound to be bad in that type of case. Surgeons too had been much too ready to operate, too soon and too drastically. This is shown by the number of extensive laminectomies and secondary operations and secondary fusions, where results had not been good.

The position as regards operative treatment may be well summed up in the conclusion to Aitken and Bradford's paper as follows:-

"We believe that better results could be obtained, first, by the use of adequate conservative treatment before any operative procedure is considered; second, by more careful observation, especially the mental make-up of the individual; third, the adoption of primary fusion in cases

"of definite instability; fourth, by the principles of rigid fixation to the fusion operation; fifth, by the preservation of the facets if no fusion is contemplated; sixth, by the application of common sense in exploratory laminectomies."

In the discussion which followed this paper most of the surgeons present were in agreement, and Mr. Hubert Wagner of Pittsburg suggested the following advice to those concerned with the treatment of sciatica "Operation in the last instance, instead of the first."

For details of operative surgical treatment, "Neurological Surgery" Loyal Davis (1946) should be consulted.

OTHER PROCEDURES IN TREATMENT.

Nerve Stretching:

This treatment is designed to break down adhesions in the course of the sciatic nerve, and thus has very little scientific basis. Occasionally cases seem to be benefited, perhaps by the movement dislodging the nerve root which happens to be on the apex of the herniated disc, but it is more likely that the effect is psychological. In my opinion this is a form of treatment which should not be used at all.

Manipulation:

There appears to be little objection to this manoeuvre when performed without anaesthesia, as a simple rotation of the trunk. Where there is principally upper gluteal pain

with a minimum of distal sciatic pain, manipulation appears to succeed occasionally in relieving stiffness, simply by muscle stretching, but where there are neurological signs it is better to avoid manipulation.

Under anaesthesia manipulation is probably dangerous, as shown by one of Goldthwait's cases, his first (1911),in which paraplegia resulted.

Clearly, heroic measures should not be applied to a disorder which is usually self limiting and in which manipulation may further dislodge the already herniated disc.

Epidural Injections:

I have no personal experience of this form of treatment but Fletcher (1947) states that it is sometimes successful. Fletcher (Medical Disorders of the Locomotor System, 1947, p.609) says that "the theory behind this form treatment is that if the epidural space is filled with fluid under pressure small adhesions along the exit of the nerves from this space will be ruptured and pain alleviated." The injection is made into the sacral hiatus by means of a Howard's lumbar puncture needle and a two-way syringe with normal saline solution. Fletcher recommends 300 to 500 ccs of the solution and stresses the need for strict asepsis.

Pyriformis Syndrome:

The treatment of this condition has been detailed along with the description of the syndrome.

SUMMARY OF TREATMENT.

Most cases respond to medical treatment, which includes adequate rest, correction of postural abnormalities and control of pain.

Only after a sufficient trial of medical means should surgical treatment be adopted. The methods of medical and orthopaedic treatment likely to be successful in the treatment of sciatica have been described.

S U M M A R Y.

The history of the progress to the modern conception of sciatica has been sketched. This shows that the conception of sciatica as a neuritis predominated until 1934 when Dandy and Mixter by their work drew attention to displacements of the intervertebral disc as a cause of sciatic pain. This is now held to be the commonest single cause, and in the series of cases described in this thesis, this opinion is supported, and an explanation offered suggesting that the so-called fibrositic type of sciatica is of central origin, viz. caused by lesions of the intervertebral disc and adjacent ligamentous structures, the changes found in the muscles being secondary.

The position is maintained, that sciatica is still a medical disorder, and that surgery should be reserved for those cases which do not respond to medical treatment. Surgical treatment should be as conservative as possible with conservation of the articular facets especially, in order to maintain the stability of the spinal column.

A method of investigation of a case of sciatica has been described and attention has been drawn to the correction of postural and other deformities by orthopaedic and physiotherapeutic measures.

The use of local anaesthesia both in investigation and in treatment has been described.

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